Welcome to Oregon Tech
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**User’s Guide**
To assist you in navigating the 2015-16 University Catalog, we have organized its contents into nine major areas. The index at the end of this catalog can help in locating specific information. The general catalog is printed annually and available on the web at www.oit.edu.

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General Information

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. It is open weekdays from 8 a.m. to 5 p.m. to serve prospective students, applicants and their families, as well as high school guidance counselors, college-transfer advisors and teachers.

If you are interested in seeing the Klamath Falls campus, the Admissions Office’s visit coordinator can arrange for you to meet with a faculty member and an admissions counselor, tour the residence halls and the rest of the campus, sit in on a class and/or talk with one of our coaches. To set up a campus visit, call (800) 422-2017 or (541) 885-1150. Hearing-impaired persons may call the TTY number: (541) 885-1072. You also can request a campus visit at www.oit.edu or by emailing oit@oit.edu. If you wish to visit one of Oregon Tech’s other campuses, the Admissions Office can provide you with a contact person who can make arrangements for you.

Non-Discrimination Policy
Oregon Institute of Technology does not discriminate on the basis of race, color, ethnicity, national origin, gender, disability, age, religion, marital status, sexual orientation or gender identity in its programs and activities. The following person is designated to handle inquiries and complaints regarding this non-discrimination policy: Affirmative Action Officer, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801; (541) 885-1108; Fax (541) 851-5200; email: ron.mccutcheon@oit.edu.

Students with Disabilities
Oregon Institute of Technology is committed to accommodating the academic and programmatic needs of qualified students with disabilities. Students with disabilities who anticipate needing accommodations should contact Services for Students with Disabilities, LRC 223, as soon as possible in advance of enrollment, to ensure timely provision of services. Questions may be directed to: Services for Students with Disabilities, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801. (541) 885-1129.

Alternate Format
This publication is available in an alternate format for persons with disabilities. Please contact Services for Students with Disabilities at (541) 885-1129.

Accreditation
Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. Accreditation, licensure or approval of individual programs are listed in departmental sections. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

General Catalog Production
The 2015-16 General Catalog was produced by the Registrar’s Office and the Marketing and Communication Department at Oregon Tech. Wendy Ivie, University Registrar; Dana Henry, Program Representative; Ashley Van Essen, Public Relations Representative; typesetting and cover design by Bill Goloski, Publications and Graphic Design Manager. Information in this catalog was accurate at the time of publication, but is subject to change without notice and does not constitute a contract between Oregon Tech and the student or applicant. The general catalog is printed annually and available on the web at www.oit.edu.
History at a Glance

1947 – July 14, Under the direction of Winston Purvine, the first classes were held in a deactivated World War II Marine Corps hospital three miles northeast of Klamath Falls.

1950 – KTEC radio went on the air.

1953 – Associate degree programs in the Surveying and Structural Engineering Technologies were first accredited by the Engineers' Council for Professional Development.

1956 – KOTI television opened on campus.

1957 – The institute was made a separate division of the State Board of Education and an engineering study was begun to determine whether to repair or rebuild the facilities.

1960 – The institute was transferred to the jurisdiction of the State Board of Higher Education.

1962 – The institute was accredited by the Northwest Association of Secondary and Higher Schools.

1964 – The campus moved to newly constructed buildings on a geothermal site overlooking Upper Klamath Lake.

1966 – The institute received authorization to grant bachelor's degrees.

1970 – Bachelor's degree programs first accredited by ABET.

1975 – Geo-Heat Center established.

1976 – Kenneth Light appointed President upon Purvine’s retirement.

1983 – Larry Blake appointed President and the Metro Center was established in Portland.

1984 – Small Business Development Center established.

1988 – Portland Metro Center moved to its first permanent facilities on Southeast Harmony Road near Clackamas Town Center.

1989 – State Board authorized Oregon Tech to grant master degrees.

1991 – Lawrence J. Wolf appointed President.

1995 – Master's degree first offered.

1998 – Martha Anne Dow appointed President.

2001 – Oregon Renewable Energy Center established.

2005 – Oregon Center for Health Professions established.

2008 – Christopher G. Maples appointed President.

2012 - Wilsonville Campus opens.

2015 – Oregon Institute of Technology became an independent public body governed by Board of Trustees.
President’s Welcome

Welcome to Oregon Tech! You have chosen a university that will challenge you, excite you, and provide you with many opportunities to excel while on campus, and after you begin your chosen career. Oregon Tech graduates are known for their ability to excel immediately in the private, public and nonprofit sectors, or in graduate and professional schools if you choose to continue your education. Because of the applied approaches used in our degree programs, Oregon Tech graduates earn some of the highest starting salaries in the nation – now about $54,000 a year – and are among the top 15% in mid-career salaries as well.

The small class size and hands-on approach to education at Oregon Tech are perfectly tailored to a learning environment that encourages communication, collaboration, and competency. Oregon Tech is focused on students, student satisfaction, and student success. We are proud of our students’ accomplishments and their post-graduation successes as alumni.

Our tagline, “Hands-on education for real-world achievement,” is more than a slogan – it truly is the way we do business. Faculty members bring their real-world problem-solving experiences into the classroom, and Oregon Tech students have myriad opportunities to gain hands-on experience outside the classroom through externships, internships, cooperative programs, and capstone projects.

By attending Oregon Tech, you have chosen an education and a future that we know will be filled with learning, success, satisfaction, and a lifelong connection to the university and to each other. By attending Oregon Tech, you have chosen rigor, quality, and relevance. By attending Oregon Tech, you are part of the excellence, innovation, and success that have served Oregon Tech’s graduates well and have continuously increased our reputation and rankings in Oregon, the Pacific Northwest, and nationally.

Welcome to the Oregon Tech Family – we’re glad you’re here and we very much look forward to helping you achieve your own personal success while you are here as students and after you graduate as alumni!

Mission Statement and Core Themes

Mission Statement
Oregon Institute of Technology offers innovative and rigorous applied degree programs in the areas of engineering, engineering technologies, health technologies, management, and the arts and sciences. To foster student and graduate success, the university provides an intimate, hands-on learning environment, focusing on application of theory to practice. Oregon Tech offers statewide educational opportunities for the emerging needs of Oregon’s citizens and provides information and technical expertise to state, national, and international constituents.

Core Themes
Oregon Institute of Technology:
• Applied Degree Programs
• Student and Graduate Success
• Statewide Educational Opportunities
• Public Service
Essential Learning Outcomes for Students

Oregon Tech’s Essential Student Learning Outcomes (ESLOs) support Oregon Tech’s institutional mission and core themes. The outcomes and associated criteria reflect the rigorous applied nature of Oregon Tech’s degree programs.

The ESLOs reflect the common expectations about the knowledge, skills, and abilities that Oregon Tech students will acquire and are reflected in the General Education requirements that lay the foundation upon which the major curricula build. Engaging in these ESLOs will support Oregon Tech graduates in developing the habits of mind and behaviors of professionals and lifelong learners.

Oregon Tech students will:

• communicate effectively orally and in writing;
• engage in a process of inquiry and analysis;
• make and defend reasonable ethical judgments;
• collaborate effectively in teams or groups;
• demonstrate quantitative literacy;
• explore diverse perspectives.

About Oregon Tech

For nearly 70 years, Oregon Institute of Technology (Oregon Tech) has focused on changing the lives of Oregonians by preparing them to meet the technical and management needs of business, industry and healthcare agencies, and is accredited by the Northwest Commission on Colleges and Universities. Individual programs also are accredited by the appropriate professional organizations. Oregon Tech offers Bachelor of Science programs in engineering, health technologies, management, communication and the applied sciences. These include bachelor degree-completion programs offered online and over 20 bachelor and master programs that can be entirely completed at the Wilsonville Campus. Oregon Tech also offers a number of associate degree programs, both online and in Salem and La Grande, Oregon.

With a mission to deliver technology education throughout the Pacific Northwest, we partner with business and industry leaders to ensure our programs adapt to new technologies and workforce demands. Oregon Tech’s real-world focus gives our students a competitive edge: nearly 90 percent are employed or in graduate school within six months of graduation. Year after year, our baccalaureate graduates garner the highest starting salaries in Oregon and among the highest in the nation.

Our applied approach to teaching, which blends theory and practice, is the main reason our graduates and alumni are so avidly recruited. Oregon Tech students have amazing opportunities to apply what they learn in lab-based classes, clinics, externships and workplaces. Oregon Tech’s faculty and staff, who come to Oregon Tech with relevant business, industrial, or clinical experience, reinforce this practical focus in the classroom. And in every program, a relevant general-education core underscores major studies, broadening students’ understanding of the world and teaching them to communicate effectively, solve problems, and think for themselves. This student-focused approach to teaching and learning provides many benefits of a private education at a public price.

One Oregon Tech, Two Primary Campuses, Program-Specific Branch Campuses, and E-Learning, too!

Oregon Tech is one institution with multiple locations. Established in 1947, Oregon Tech offers degree programs at locations throughout the State of Oregon and even beyond to meet the needs of students seeking a top quality, hands-on education.

The main, residential campus is located in Klamath Falls in beautiful Southern Oregon. Our campus in Klamath Falls is nestled on the eastern slope of the Cascade Mountains. The 190-acre campus offers spectacular views of Upper Klamath Lake, pine-studded knolls and snow-capped peaks from nearly every building. Klamath Falls, a city of about 20,000 residents (45,000 in the urban growth area), is located in Klamath County in south-central Oregon, about 20 miles from the California border and in the same county that has Crater Lake National Park. Known as Oregon’s “City of Sunshine,” Klamath Falls enjoys about 300 days of blue skies each year.

Our campus in Wilsonville, located just south of the greater Portland metro area, offers degree programs in a state-of-the-art facility designed to provide an industry-focused, urban university experience at the heart of “Silicon Forest”. The Wilsonville campus offers over 20 high-demand degree programs at the BS and MS level. The campus is easily accessible to business professionals and provides excellent opportunities for students seeking internships and employment while completing their degrees. Oregon Tech serves students and employers in the Portland metropolitan area by offering university degree programs at the Oregon Tech Wilsonville campus and the Willow Creek Center (WCC) in Beaverton.

Oregon Tech offers online programs through the Online Learning department. Oregon Tech understands that working professionals are busy and ready to advance their education as quickly and conveniently as possible. Oregon Tech Online lets you finish your certificate, associate, or bachelor's degree without leaving your home or office and without the hassles of travel, childcare or giving up your current job. The primary mission of Oregon Tech Online is to offer convenient programs and courses to admitted and non-admitted students.
must hold professional credentials to be eligible for admission to the program, employment in the field is not a requirement of admission.

Since 2005, Oregon Tech has partnered with Oregon Dental Service and Eastern Oregon University to provide Oregonians the opportunity to obtain an Associate of Applied Science degree in Dental Hygiene in La Grande. The university also offers a baccalaureate program in dental hygiene in Salem through a partnership between Oregon Tech and Chemeketa Community College. The classrooms and dental hygiene clinic are located in Chemeketa's new, state-of-the-art Health & Sciences Building. The program requires one year of prerequisite (pre-dental hygiene) coursework prior to acceptance.

Oregon Tech Seattle at Boeing offers Bachelor and Master of Science Degrees in Manufacturing Engineering Technology, as well as a Bachelor of Science Degree in both Mechanical Engineering and Mechanical Engineering Technology to employees of The Boeing Company at sites in the Puget Sound area. Also offered are review classes for the Society of Manufacturing Engineers’ CMfgT and CMfgE exams and three Certificates of Completion; two in Composites, and one in Computer Aided Design.

Oregon Tech is accredited by the Northwest Commission on Colleges and Universities. Additional accreditations, licensure and approvals of individual programs are listed in the appropriate program sections of this catalog. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Institute of Technology, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

As of January 2015, Oregon Tech Online is an approved institutional participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA) initiative, which allows for increased access to online courses for many out of state students. Oregon Tech Online is authorized by the Washington Student Achievement Council and meets the requirements and minimum educational standards established for degree-granting institutions under the Degree-Granting Institutions Act. This authorization is subject to periodic review and authorizes Oregon Institute of Technology to offer field placement components for specific degree programs. The Council may be contacted for a list of currently authorized programs. Authorization by the Council does not carry with it an endorsement by the Council of the institution or its programs. Any person desiring information about the requirements of the act or the applicability of those requirements to the institution may contact the Council at P.O. Box 43430, Olympia, WA 98504-3430.
Academic Programs
Degree Programs

Klamath Falls

Master of Science
- Civil Engineering
- Manufacturing Engineering Technology

Bachelor of Applied Science
- Technology and Management

Bachelor of Science
- Applied Mathematics
- Applied Psychology
- Biology
- Biology-Health Sciences
- Civil Engineering
- Communication Studies
- Computer Engineering Technology
- Dental Hygiene
- Diagnostic Medical Sonography
- Echocardiography
- Electrical Engineering, with emphasis in:
  - Electrical Power
  - Microelectronics
  - Renewable Energy
- Embedded Systems Engineering Technology
- Environmental Sciences
- Geomatics, with options in:
  - Geographic Information Systems
  - Surveying
- Health Care Management with options in:
  - Administration
  - Clinical
  - Radiologic Science Management
- Health Informatics
- Information Technology
- Management, with options in:
  - Accounting
  - Entrepreneurship/Small Business Management
  - Marketing
- Manufacturing Engineering Technology
- Mechanical Engineering
- Nuclear Medicine Technology
- Nursing (through OHSU School of Nursing)
- Operations Management
- Radiologic Science
- Renewable Energy Engineering
- Respiratory Care
- Software Engineering Technology
- Vascular Technology

Associate Degrees
- Associate of Applied Science
  - Sleep Health:
    - Clinical Sleep Health
    - Polysomnographic Technology
- Associate of Engineering
  - Computer Engineering Technology
  - Software Engineering Technology

Minors
- Arts, Literature, and Philosophy (ALPS)
- Applied Mathematics
- Applied Physics
- Applied Statistics
- Biology
- Business
- Chemistry
- Geographic Information Systems
- Human Communication
- Information Technology
- International Business
- Medical Sociology
- Psychology
- Surveying
- Technical Communication

Specializations
- Accounting
- Entrepreneurship/Small Business Management
- Marketing
- Picture Archiving and Communication Systems (PACS)

Certificates
- Accounting (post baccalaureate)
- Applied Behavior Analysis (Graduate)
- Dispute Resolution
- Polysomnographic Technology
- Sleep Health

Wilsonville

Master of Science
- Manufacturing Engineering Technology
- Renewable Energy Engineering

Bachelor of Applied Science
- Technology and Management

Bachelor of Science
- Clinical Laboratory Science (joint degree with OHSU)
- Electrical Engineering, with emphasis in:
  - Electrical Power
  - Microelectronics
  - Optical Engineering
  - Renewable Energy
  - Robotics, Automation, and Control
  - With dual Major in:
  - Robotics, Automation, and Control
  - Optical Engineering
  - Systems Engineering & Technical Management
- Electronics Engineering Technology
- Emergency Medical Services (joint degree with OHSU)
- Embedded Systems Engineering Technology
- Geomatics, with options in:
  - Geographic Information Systems
  - Surveying
- Health Informatics
- Information Technology
- Manufacturing Engineering Technology
- Mechanical Engineering Technology
- Operations Management
- Renewable Energy Engineering
- Software Engineering Technology

Associate of Applied Science
- Emergency Medical Technology–Paramedic (joint degree with OHSU)

Minors
- Applied Mathematics
- Business
- Information Technology
- Psychology
- Surveying

Certificates
- Applied Behavior Analysis (Graduate)
Online

**Master of Science**
- Manufacturing Engineering Technology

**Bachelor of Applied Science**
- Technology and Management

**Bachelor of Science**
- Dental Hygiene *(degree completion)*
- Diagnostic Medical Sonography *(degree completion)*
- Echocardiography *(degree completion)*
- Health Care Management with options in: Clinical and Radiologic Science Management
- Health Informatics
- Information Technology
- Operations Management
- Radiologic Science *(degree completion)*
- Respiratory Care *(degree completion)*
- Vascular Technology *(degree completion)*

**Associate of Applied Science**
- Sleep Health
  - Clinical Sleep Health
  - Polysomnographic Technology

**Minors**
- Psychology
- Business
- Information Technology

**Specialization**
- Picture Archiving and Communication Systems (PACS)

**Certificates**
- Clinical Sleep Health
- Polysomnographic Technology

Seattle at Boeing

**Master of Science**
- Manufacturing Engineering Technology

**Bachelor of Science**
- Manufacturing Engineering Technology
- Mechanical Engineering
- Mechanical Engineering Technology

Chemeketa Community College

**Bachelor of Science**
- Dental Hygiene

La Grande (ODS College of Dental Sciences)

**Associate of Applied Science**
- Dental Hygiene
Academic Calendar 2015-16

Fall Term, 2015
MAY 11-21 ......................... Registration for Fall Term
SEP 24-25 ......................... Registration for those not registered in advance (new freshmen, new transfer students, and new non-admitted students and re-enrolling students)
SEP 25-26 ......................... New student orientation
SEP 28 ............................. Classes begin
OCT 2 ............................. Last day to use Web for Student for all registration changes
OCT 9 ............................. Last day to pay fees or register without late charge
OCT 9 ............................. Last day to drop without a “W”*
NOV 9-20 ......................... Registration for Winter Term
NOV 13 ............................ Last day to course withdraw*
NOV 11 ............................ Veterans Day holiday
NOV 26 (1:00 p.m.) ................. Thanksgiving holiday
DEC 4 ............................. Last day to completely withdraw from the University
DEC 7-10 .......................... Final exams week
DEC 11 ............................ Fall Term ends

Winter Term, 2016
NOV 9-20, 2015 ..................... Registration for Winter Term
JAN 1 ............................. New Year’s holiday
JAN 4 ............................. Registration and orientation for new students
JAN 4 ............................. Classes begin
JAN 8 ............................. Last day to use Web for Student for all registration changes
JAN 15 ............................. Last day to pay fees or register without late charge
JAN 15 ............................. Last day to drop without a “W”*
JAN 18 ............................ Martin Luther King, Jr. holiday
FEB 15-25 ......................... Registration for Spring Term
FEB 19 ............................. Last day for course withdraw*
MAR 11 ............................ Last day to completely withdraw from the University
MAR 14-17 .......................... Final exams week
MAR 18 ............................ Winter Term ends

Spring Term, 2016
FEB 15-25 ......................... Registration for Spring Term
MAR 28 ............................ Registration and orientation for new students
MAR 28 ............................ Classes begin
APR 1 ............................. Last day to use Web for Student for all registration changes
APR 8 ............................. Last day to pay fees or register without late charge
APR 8 ............................. Last day to drop without a “W”*
MAY 2 ............................. Registration for Summer Term for all students begins
MAY 9-19 ........................... Registration for Fall Term
MAY 13 ............................ Last day for course withdraw*
MAY 30 ............................ Memorial Day holiday
JUN 3 ............................. Last day to completely withdraw from the University
JUN 6-9 ............................ Final exams week
JUN 10 ............................. Spring Term ends
JUN 11 ............................ Commencement

Summer Term, 2016 (8-week session)
MAY 2 ............................. Registration for all students begins
JUN 20 ............................. Classes begin
AUG 12 ............................. Summer Term ends

First 4-week Session
JUN 20 ............................. Classes begin
JUL 15 ............................. First 4-week Session ends

Second 4-week Session
JUL 18 ............................. Classes begin
AUG 12 ............................. Second 4-week Session ends
Admissions and Financial Aid
Office of Admissions

College Union, 1st Floor
800-422-2017 (toll free)
(541) 885-1150
(541) 885-1024 (fax)
oit@oit.edu
www.oit.edu/admissions

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. Open weekdays from 8 a.m. to 5 p.m., its primary functions are to help prospective students investigate and evaluate Oregon Tech, to manage applications for admission and to assist applicants with the enrollment process. The Admissions Office operates with the cooperation and support of the entire campus community.

Admissions welcomes visiting students and their families to daily tours, and sessions with admissions counselors, coaches, and other staff. Oregon Tech also hosts several Campus Preview events annually. For Campus Preview dates or to register online for a visit or Campus Preview, go to www.oit.edu/visit or call 541-885-1150 or 800-422-2017. To visit Oregon Tech Wilsonville, call 503-821-1250.

Hearing impaired persons may call the TTY number at 541-885-1072.

Admission requirements apply to all applicants of Oregon Tech. All students who wish to enroll in more than eight credits in a term, receive financial aid and/or graduate from Oregon Tech must apply and be accepted for admission. Applications for general admission (excluding programs requiring specialized admission) are processed on the campus in Klamath Falls regardless of the campus location for the student.

Application Deadlines

The priority application deadline for maximum scholarship and financial aid consideration each fall term is March 1. Oregon Tech accepts applications on a rolling basis, but students must have a complete application on file in Admissions three weeks prior to the first day of classes as follows:

<table>
<thead>
<tr>
<th>Term</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Term</td>
<td>September 7, 2015</td>
</tr>
<tr>
<td>Winter Term</td>
<td>December 14, 2015</td>
</tr>
<tr>
<td>Spring Term</td>
<td>March 7, 2016</td>
</tr>
<tr>
<td>Summer Term</td>
<td>May 30, 2016</td>
</tr>
</tbody>
</table>

Applications

Applications for admission are available online at www.oit.edu/apply. A complete application consists of an application for admission, application fee, official transcripts, test scores, and other required documentation depending on the type of applicant (see Admission Eligibility Requirements).

Students who were previously admitted, but never enrolled, and students who want to re-enroll after skipping four or more terms must log back into the online application and click the link entitled “new” which is located under the “Admission Term” heading, then select the appropriate application to update their information. Students who have not yet registered for classes may change their entry term by logging back into the online application and click on the link entitled “new” which is located under the “Admission Term” heading, then select the appropriate application to update their term. Students who want to only update their choice of major or choice of campus must use the Application Change Form located online at www.oit.edu/applications under “Other Commonly Used Forms.”

Students who wish to enroll as non-degree seeking students in no more than eight credits per term may submit a Non-Admit Application form; however students must be fully admitted to qualify for financial aid. These forms are available online at www.oit.edu/applications.

International students must complete the International Student Application. Students seeking enrollment through an approved exchange program must complete the International Exchange Application. Both are available online at www.oit.edu/international.

The MS-Manufacturing Technology, MS-Renewable Energy Engineering, and the following majors require a secondary application process after students are granted general admission and after students meet the eligibility requirements of the program. Each program has its own deadlines, admission requirements and processes which are outlined in the departmental pages of this catalog.

Clinical Laboratory Science (OHSU/Wilsonville)
Diagnostic Medical Sonography
Dental Hygiene (Klamath Falls, La Grande, Salem)
Echocardiography
Nuclear Medicine Technology
Nursing (with OHSU/Klamath Falls)
Paramedic/EMT (OHSU/Wilsonville)
Radiologic Science
Respiratory Care
Vascular Technology
Application Procedures

Every applicant must complete the following steps:

1. Complete the appropriate Application for Admission (www.oit.edu/applications).

2. Submit the $50 non-refundable application fee. (Applicants to online programs submit an additional $50 non-refundable Online Program Fee). Checks or money orders should be made payable to Oregon Tech. Students who qualify may opt to defer the application fee until enrollment in classes. OUS Application Fee Deferral Forms are available at www.oit.edu/applications.

3. Applicants who have earned fewer than 36 college credits must have official SAT I or ACT scores sent to Oregon Tech. Some applicants who graduated from high school three or more years ago may be exempted from this requirement by permission of the Admissions Director.

4. Have official transcripts from all postsecondary institutions that you attended, or received credit from, sent directly to the Oregon Tech Admissions Office. Any offer of admission is contingent upon the submission of satisfactory final transcripts prior to enrollment at Oregon Tech.

5. Have official high school transcripts or GED test results sent directly to the Oregon Tech Admissions Office. High School records are not required from applicants who graduated prior to 1997 and who have earned at least 36 college credits. Applicants who are currently enrolled in high school may be admitted on the basis of six or more semesters of high school work provided that they will have met the 15 subject requirements at the time of high school graduation. In any case, each student’s final official high school transcript must be provided upon graduation to complete the admission process.

6. Have official Advanced Placement (AP) or International Baccalaureate (IB) score reports sent to the Oregon Tech Admissions Office, if applicable.

When applying to an online program, submit an Eligibility Verification Form (http://bit.ly/1a3EOud). This will help ensure you meet any additional requirements of your desired program. To see eligibility requirements, visit www.oit.edu/online/degrees, and select your desired program.

Some programs at Oregon Tech do not have sufficient space to enroll all qualified applicants who seek admission. In these cases, Oregon Tech reserves the right to offer admission to the most qualified applicants, on a first-come, first-served basis or through a combination of the two strategies.

Upon admission and prior to registration, a completed health form showing evidence of adequate immunizations must be on file with Oregon Tech’s Student Health Center. For further information, see the Student Health Center section of this catalog. Students are not required to submit these forms if taking fewer than six credits per term.

If a student fails to submit the required documents in complete and satisfactory order, admission and registration may be cancelled. All records become the property of Oregon Tech.

Social Security Number Disclosure and Consent Statement

Students are requested to provide, voluntarily, a Social Security Number (SSN) to assist Oregon Tech in developing, validating or administering predictive tests and assessments; administering student aid programs; improving instruction; internal identification of students; student parking; collection of student debts; or comparing student educational experiences with subsequent workforce experiences. By providing your Social Security Number, students consent to the uses identified above. This request is made pursuant to ORS 351.070 and 351.085.

Provision of a Social Security Number and consent to its use is not required and, if a student chooses so, will not be denied any right, benefit or privilege provided by Applicants may enter a series of zeros (000-00-0000) on their admission application in place of their actual SSN, but should be aware that by not providing their SSN they will not be eligible to receive federal student aid or university scholarships.

Additionally, applicants should be aware that Oregon Tech is required to obtain a Social Security Number in order to file certain returns with the Internal Revenue Service (IRS) for the applicant to receive a 1098T and to furnish a statement to you. The returns that Oregon Tech must file contain information about qualified tuition and related expenses. Privacy Act Notice: Section 6109 of the Internal Revenue Code requires students to give a correct SSN to persons who must file information returns with the IRS to report certain information. The IRS uses the SSN for identification purposes and to help verify the accuracy of tax returns. For more information, refer to IRS code 6050S.
Admission Requirements

Freshman Admission
Academic performance is not the sole criterion for admission. Oregon Tech may evaluate a person’s behavior and background to determine their ability to maintain the standards of academic and professional conduct expected at the university. An evaluation may take into consideration current behavior and performance as well as past experiences and actions. Simply qualifying for admission does not guarantee admission.

For freshman admission, students must meet entrance requirements adopted by the State Board of Higher Education in Oregon. Applicants who are enrolled in or who have graduated from regionally accredited high schools must:

1. Submit an official high school transcript. An unweighted cumulative high school grade point average of 3.00 is required for admission. Applicants with a GPA between 2.50 and 2.99 may qualify for admission provided they submit adequate SAT Reasoning Exam scores or ACT scores.

2. Submit results from either the SAT Reasoning Exam, SAT I or ACT
   a. Applicants with an unweighted cumulative high school grade point average of 3.00 or better must take the SAT or ACT and have official scores submitted to Oregon Tech, but there is no minimum SAT or ACT score.
   b. Applicants with an unweighted GPA of 2.75 to 2.99 must submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.
   c. Applicants with an unweighted GPA of 2.50 to 2.74 must submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.
   d. Applicants who have graduated from a standard high school three or more years prior to the term they wish to be admitted and enter the university are not required to submit SAT or ACT aptitude test scores. However, if an applicant wishes to be considered for university scholarships, they must submit aptitude test scores.

3. Applicants must satisfactorily (grade of C- or above) complete at least 15 units (one year is equal to one unit) of college preparatory work in the following areas, unless they graduated from high school prior to spring 1985.
   a. English (4 units). Shall include the study of the English language, literature, speaking and listening, and writing, with emphasis on and frequent practice in writing expository prose during all four years.
   b. Mathematics (3 units). Shall include first-year algebra and two additional years of college preparatory mathematics selected from geometry (deductive or descriptive); advanced topics in algebra (through Algebra II), trigonometry, analytical geometry, finite mathematics, advanced applications, calculus, and probability and statistics, or courses that integrate topics from two or more of these areas. One unit is strongly recommended in the senior year. (Algebra and geometry taken prior to 9th grade will be accepted.)
   c. Science (3 units). Shall include at least one year each in two fields of inquiry based college preparatory science such as biology, chemistry, physics, or earth and physical science. Science courses that are “inquiry based” provide students the opportunity to apply scientific reasoning and critical thinking to support conclusions or explanations with evidence from their investigations. It is strongly recommended that one year be taken as a laboratory science.
   d. Social Studies (3 units). Shall include analysis of societal issues and events. It is strongly recommended that study includes knowledge and use of geographic information, patterns of United States history, patterns of human history, structures and systems of US Government, and analysis of economic systems.
   e. Second Language (2 units). Shall include two years of the same high school-level second language, or a C- or better in the third year of a high school-level language, or two terms of a college-level second language with a grade of C- or better, or satisfactory performance on an approved assessment of second language proficiency. Demonstrated proficiency in an American Indian language can meet all or part of the second language requirement, as certified by the governing body of any federally recognized tribe. American Sign Language meets the second language requirement. The second language requirement only applies to applicants graduating from high school in 1997 or later. If admitted as an exception, students failing to meet this requirement must complete two terms of the same college-level second language with a C- or better before earning a degree from Oregon Tech.

Applicants who are unable to meet the 15 subject requirements may be eligible for admission by earning a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (in Math level I or IIC and another test of the student’s choice). Students who do not take a SAT Subject test in a second language must prove language proficiency through another approved process.

Applicants who have not graduated from high school and who are applying on the basis of GED scores must submit test results showing a minimum of 170 on each subject area and 680 overall. A special admission option will be offered to test takers who scored no lower than 150 on the Reasoning Through Language Arts Test, no lower than 150 on the Social Studies Test, no lower than 160 on the Science Test, and no lower than 170 on the Mathematics Reasoning Test.

GED tests taken prior to 2015 must show a
minimum composite score of 580 (58 on GED exams administered prior to 2002) with a minimum score of 410 on each GED subtest (41 on subtests administered prior to 2002). GED applicants must meet the Foreign Language requirement. Applicants whose pre-2015 GED scores fall below these standards may qualify on the basis of a combination of GED and SAT Reasoning or ACT exam results:

Applicants with GED composite scores of 550 to 570 (55 to 57 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.

Applicants with GED composite scores of 500 to 540 (50 to 54 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.

Public high school students must graduate from a standard or regionally accredited high school. Private high school students must graduate from regionally accredited high schools. Home-schooled students and graduates of unaccredited or non-standard high schools, as well as applicants who fail to meet the 15 subject requirements, may be admitted by submitting SAT Reasoning Exam score of 1000 on the Math and Critical Reasoning sections combined or an ACT composite score of 21 or better and a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (Math level I or IIC and another test of the student’s choice, in a subject other than math). An examination in a second language is strongly recommended to qualify the applicant for admission by meeting the language proficiency requirements. Students who do not take an SAT Subject test in a second language must prove language proficiency through another approved process.

Transfer Admission

A transfer student is one who has previously earned credits at another regionally accredited institution of higher education. A student must have earned at least 36 college-level credit hours (24 semester credits) to be admitted on the basis of his/her college record alone.

- Transfer applicants must have a cumulative 2.25 GPA or better in college level classes unless they hold an Oregon Transfer Module (OTM) or an associate or bachelor’s degree, in which case, a cumulative GPA of 2.0 is required.
- In order to be admitted to Oregon Tech, transfer applicants must demonstrate proficiency in English and Math by completing the equivalent of Math 95 (Intermediate Algebra) or higher and WRI 115 (Introduction to Writing) or higher with grades of “C-” or better.
- Transfer applicants must have completed two terms of a college-level second language with a grade of C- or better, or two years of the same high school-level second language with grades of C- or better, or satisfactory performance on an approved second language assessment of proficiency. Demonstrated proficiency in American Indian language can meet all or part of the second language requirement, as certified by the governing body of any federally recognized tribe. American Sign Language meets the second language requirement. The second language requirement applies to transfer applicants graduating from high school in 1997 or after.
- Applicants who do not have an Associate’s or a Bachelor’s degree must have at least 36 college-level credits. If more than 10 percent of an applicant’s credits are in Physical Education, credits beyond the 10 percent threshold will not be counted toward meeting GPA requirements.
- Applicants must be eligible to re-enroll in the previous institution attended.

Official transcripts from all postsecondary institutions must be submitted for consideration. Applicants who graduated from high school after 1997 must also submit official high school transcripts, unless they have completed two terms of college-level study in a second language.

Official transcripts from all postsecondary institutions must be submitted for consideration. Applicants who graduated from high school after 1997 must also submit official high school transcripts, unless they have completed two terms of college-level study in a second language.

Applicants who have earned fewer than 36 quarter or fewer than 24 semester hours of college-level work must also provide high school transcripts or GED scores. They must also provide SAT I or ACT scores. In some cases, these applicants must submit SAT/ACT scores. Admission will be based on both high school and transfer GPA and subject requirements. Students who have completed fewer than 12 transferable quarter credits (8 semester) must meet freshman admission requirements.

A Transfer Evaluation Report acknowledging the courses accepted by the university will be sent after admission status has been confirmed. Acceptance of vocational/technical courses may be granted after registration if the student’s administering department finds that vocational/technical courses have satisfied certain bachelor’s degree requirements. In all cases, course and/or department prerequisites will be enforced.

Transfer Articulation Agreements

Oregon Tech is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major while minimizing overlap or repeat of courses. Some agreements accept an associate’s degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at www.oit.edu/articulations; students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the
students’ academic department or the Office of Academic Agreements.

Non-Admit Students
A non-admit is a student who wishes to enroll in no more than eight credits per term at Oregon Tech, is not seeking a degree from Oregon Tech and has never been fully admitted to Oregon Tech in the past. A non-admit is not eligible for financial aid. Out-of-state residents are subject to non-resident tuition and fees upon enrolling in more than 6 credits. A tuition and fee schedule can viewed on online (www.oit.edu/college-costs/ tuition-fees). College-level classes taken while in non-admit status may be used toward Oregon Tech graduation requirements upon completion of the full admission process or may be transferred to other institutions. Enrollment as a non-admit student does not guarantee future admission to Oregon Tech. To enroll at Oregon Tech as a non-admit, submit the Non-Admit Application Form (www.oit.edu/ applications) to the Admissions Office, at least one week prior to enrollment. Oregon Tech reserves the right to deny enrollment to those who seek non-admit status.

Admission to Programs Having Clinical or Practicum Requirements
It is important that prospective students understand that admission to those programs that have clinical or practicum requirements:

1. Is selective;
2. Will be granted after consideration of an applicant’s ability to assume professional responsibility for clients, patients or students served by the program; and may be denied to any student with a record of past criminal behavior or psychiatric illness, which bears upon the student’s ability to fulfill clinical or practicum responsibilities.

Students seeking admission to online degree completion programs in Radiologic Science, Vascular Technology, Echocardiography, Diagnostic Medical Sonography, or Respiratory Care, must meet all regular admission requirements and be registered professionals working in their chosen field. This will ensure access to clinical sites as required in these programs. For more information, contact the Online Education Office.

Western Undergraduate Exchange

Students enrolled in some of Oregon Tech’s majors are eligible for the Western Undergraduate Exchange (WUE) program. WUE is a tuition-reduction program sponsored by Western Interstate Commission for Higher Education (WICHE) that can save students from the Western United States thousands of tuition dollars each year. Students from Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington, Wyoming, and Commonwealth of the Northern Mariana Islands are eligible. Students from these states who apply for WUE-eligible majors pay just 150 percent of the in-state tuition. No request is required to receive WUE. Students from WUE states who enter WUE-eligible programs will automatically be reviewed for WUE rates upon admission to Oregon Tech.

Eligible Programs
All majors in the College of Health, Arts and Sciences except:

- Clinical Laboratory Science and pre-Clinical Laboratory Science
- Dental Hygiene and pre-Dental Hygiene
- Medical Imaging Technology and pre-Medical Imaging Technology
- Nursing after acceptance by Oregon Health Sciences University
- Emergency Medical Services, Pre-Paramedic, Paramedic, EMS Management

All majors in the College of Engineering, Technology and Management.

WUE is not offered for the Oregon Tech Online Education programs. WUE students are ineligible for the Presidential Academic Scholarship, although WUE offers the greater savings for non-resident students.

WUE Requirements
To maintain eligibility you must:

- Remain continuously enrolled throughout fall, winter, and spring of the academic year. Summer enrollment at Oregon Tech is not required to maintain eligibility.
- Enroll in at least 12 credits per term and maintain Satisfactory Academic Standing. Students who are simultaneously admitted to Oregon Tech and a community college to allow dual enrollment must take at least 9 credits per term from Oregon Tech with a combined total of 12 credits per term. GPA and completed credits are monitored each academic year.
- Students wishing to ‘stop-out’ of enrollment for a term must submit a written request to the Office of the Registrar before the start of that term. Requests are granted at the discretion of the university.
- Be seeking your first bachelor’s degree
International Student Admission
Oregon Tech welcomes international students as applicants and as vital members of its campus community. In applying for admission, send the following to the Admissions Office:

1. An International Student Application for Admission accompanied by a $50 (U.S.) non-refundable fee.
2. Official transcripts, in English or with an accompanying official translation, of all high school and post-high school institutions attended.
3. Official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 190 computer-based TOEFL, 68 Internet-based TOEFL or 6 IELTS is required for consideration.
4. A completed Statement of Financial Responsibility form, indicating that you have the necessary financial resources in U.S. dollars to support yourself while enrolled.
5. A letter, if appropriate, from parents and/or sponsors indicating the amount of financial support they will provide in U.S. dollars.
6. Documentation showing that you, your parents and/or your sponsors have adequate financial resources to meet your expenses while enrolled at Oregon Tech. Examples include official bank statements, tax forms and letters of employment showing annual earnings.
7. An official credential evaluation from an Oregon Tech-approved credential service for all coursework completed at a post-secondary institution outside the United States. Examples include the Association of Collegiate Registrars and Admissions Officers (http://www.acrao.org/international/foreignEdCred.cfm) and World Education Services (www.wes.org).

A completed health history and immunization form must be submitted. In addition to the health requirements that need to be fulfilled before registration (refer to Integrated Student Health Center section of this catalog for health history and immunization requirements); international students must have at least one documented MMR vaccine on file at the Integrated Student Health Center prior to the student attending any classes (per OAR 333-050-0130). Also, students from countries identified as high risk for tuberculosis (most countries in Latin America and the Caribbean, Africa, Asia, Eastern Europe and Russia) are required to complete a TB screening upon entrance to Oregon Tech. This may include a TB skin test and/or a chest x-ray. This can be done at the Integrated Student Health Center if records are not available.

Exchange Student Admission
Oregon Tech welcomes exchange students through multiple exchange partnership agreements. Students at partner institutions work with an advisor at their “home” campus to meet the requirements of Oregon Tech’s international exchange application process. It is recommended that exchange students begin the exchange application process at least nine months prior to the planned date of entry. This allows ample time for submission of documents that the U.S. Bureau of Citizenship and Immigration Services requires Oregon Tech to collect before we can issue the I-20 form that is used to secure an F-1 visa.

Admission Exceptions
The Admissions Committee and Director of Admissions retain the right to make exceptions to the specified requirements for Admission or add stipulations to certain offers of admission. For additional information, contact the Director of Admissions.

Registration
Registration Events for new students occur prior to the start of each term. All students new to the Klamath Falls campus must participate in a Klamath Falls Registration program and all students new to the Wilsonville campus must participate in Wilsonville’s Orientation & Registration program. In addition to placement testing and meeting with advisors to plan an academic schedule, students have the opportunity during Registration to register for classes, set up Oregon Tech computer and email accounts, receive a university ID card and learn more about making a successful transition to Oregon Tech. Students are encouraged to attend an early Registration event rather than waiting to register at the beginning of a term. Visit www.oit.edu/newwings or contact the Admissions Office at (541) 885-1150 or oit@oit.edu for more information.

Placement Testing
Oregon Tech’s Student Success Center (SSC) administers all placement testing for Oregon Tech students. Student admission records are examined to determine placement requirements. Students transferring in math credit for calculus or beyond, or who have transferred in math credits to fulfill all of the math requirements for their major, are exempt from the math placement requirement. Transfer students with more than 36 transferrable college credits are exempt from the reading placement requirement. Students transferring in college-level writing are exempt from the writing placement requirement. Entering students in health programs requiring Human Anatomy and Physiology with transferrable college credit for this course are exempt from the entry assessment for the Human Anatomy and Physiology course sequence. Placement tests are available prior to the term of entry and in conjunction with new student registration. Visit www.oit.edu/newwings or contact (541) 885-1791 or testing@oit.edu for more information.

Financial Aid Programs and Application Process

The Financial Aid Office is committed to providing high-quality service to all Oregon Tech students, their families and the community. Our office strives to provide information on a complex topic that enables students to make decisions regarding their educational funding.

The information contained in this catalog is general in nature and is not meant to serve as notification of students’ rights and responsibilities as financial aid recipients. Oregon Tech’s Financial Aid Award Guide serves that purpose. The Award Guide is available on our website at www.oit.edu/faid. Additional questions regarding the application process should
be directed to the Financial Aid Office.

All students applying for federal financial aid must complete the Free Application for Federal Student Aid (FAFSA) available at www.fafsa.gov. A federally approved needs-analysis methodology is applied consistently to information provided by all applicants.

The FAFSA must be filed for each year a student wishes to be considered for financial aid eligibility.

Application Procedures/Priority Deadlines

All students applying for federal and state aid must complete the Free Application for Federal Student Aid (FAFSA) and list Oregon Tech’s school code (003211). We encourage you to file as soon after January 1st as possible to be considered for your maximum eligibility. Some funds are very limited and are expended early.

Once the FAFSA information is received and reviewed by the Financial Aid Office, new students will receive a letter instructing them on how to log into “Web for Student” to view their award letter and the federally mandated shopping sheet online. Students may accept their aid online and request changes. Returning students will receive an email to their Oregon Tech email account when their award letter is ready to view online. After accepting aid students must log back into web for student and answer the Title IV authorization questions (24 hours later). The Financial Aid Award Guide is located on our website at www.oit.edu/faid. It is important that students read the guide and follow the instructions on the letter they are sent. Any updates/changes to award letters will result in an email to the student’s Oregon Tech email account. If additional information is requested, such as tax transcripts or worksheets, students should return the documents as soon as possible to receive an Offer of Financial Aid. The award letter will list all types of aid for which the student is eligible. The Award Guide is a detailed booklet explaining programs, disbursement procedures and student rights and responsibilities, as well as cost estimates and other miscellaneous information. It is the student’s responsibility as a financial aid recipient to become familiar with the contents of the Award Guide and contact the Financial Aid Office if additional questions or concerns arise. Additionally, students should check their Oregon Tech email accounts for announcements and notifications from Financial Aid.

The philosophy behind financial aid is that parents and students have the primary financial responsibility for funding the student’s education.

If there are unusual financial circumstances that are not accurately reflected on the FAFSA, the student should contact the Financial Aid Office. Under certain conditions, professional judgment may be used and aid eligibility recalculated. The Financial Aid Office will always take the student’s best interest into consideration while, at the same time, upholding federal regulations.

Federal Supplemental Educational Opportunity Grants (SEOG)

SEOG funds are very limited at Oregon Tech. Although priority for SEOG funds is given to full-time students, Oregon Tech may, on a case-by-case basis, award SEOG funds to students enrolled at least half time. The typical award is $300 for an academic year. Only students who have not yet completed a bachelor’s degree and are eligible to receive a Pell Grant will be considered for this grant.

Federal Perkins Loan

The Federal Perkins Loan Program has no origination or guarantee fees, a nine-month grace period after a student ceases to be enrolled at least half time before repayment begins and an interest rate of five percent that begins at repayment. Awards at Oregon Tech range from $1,000 to $2,000 per year and are based on need. Priority is given to students who are attending full time, but may also be awarded on a case-by-case basis to students attending part time. If your Perkins loan is not disbursed in full term you will be ineligible for the remainder of 15-16.

Federal Work-Study Program

The Federal Work-Study Program allows students to earn money by working part time on campus or at an off-campus community service site. Information regarding available jobs and application procedures are located in the Career Services Office and on the Oregon Tech Web site. Awards are usually $1,500 per year, which can be earned at any time during the academic year provided the student is enrolled at least half time.

Direct Lending

Federal Stafford Loans (subsidized and unsubsidized) are available to most students through the federal government Direct Loan Program. Loan amounts vary based on student need and grade level in a declared major at Oregon Tech. A fee for guarantee and origination will be taken at the time of disbursement. It is currently 1.073%
Estimated Budgets for 2015-16 (as of March, 2015)
Standard Budget for Fall, Winter, Spring for Full-Time Students

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Budget increase for computer is $1,000 maximum with documentation. Please visit www.ous.edu/factreport/tuition for the most current information.

Estimated Budgets for 2015-16 (as of March, 2015)
Standard Budget for Fall, Winter, Spring for Full-Time Students

- Tuition is based on 15 credits, 2015-16 carrying load.
- Fees based on full time enrollment.
- Budget is based on $429 per month rent, $274 per month food, and $170 per month utilities for off-campus students.
- Miscellaneous expenses include medical supplies, entertainment, personal care products, housekeeping supplies, travel, and transportation.
- CLS/PAR, RCP and Dental Hygiene/La Grande have a different budget. Please consult the Oregon University fee book.
- A one-time matriculation fee is assessed for first-term students.
- MIT externs have a different budget which includes increased costs for major medical insurance, internet, and additional credits.
- A single parent may double the budgeted housing figures with documentation.
- Students enrolled in health profession majors have higher fees. Students may request actual fees to be added to budgets by the Financial Aid Office.

Budget increase for computer is $1,000 maximum with documentation. Please visit www.ous.edu/factreport/tuition for the most current information.

Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan

The Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan are loans offered by Oregon Institute of Technology. These loans have a five percent interest rate, no origination fee, and repayment begins nine months after students cease to be enrolled at least half-time.

Students must complete a promissory note to receive the funds.

Federal Parent Loans for Undergraduate Students (PLUS)

Parents of dependent students can apply for funds through Parent Loans for undergraduate students. These loans are available for up to the cost of attendance minus other financial aid and resources each year. Interest begins to accrue immediately. A 4.292% origination and guarantee fee will be taken at the time of each disbursement. Loan repayment begins 60 days after the final disbursement of the academic year. If you’re a parent PLUS borrower, you can defer repayment of Direct PLUS Loans first disbursed on or after July 1, 2008, while the student for whom you obtained the loan is enrolled at least half-time, and for an additional 6 months after the student graduates or drops below half-time enrollment (half-time enrollment status is determined by your child’s school). You must separately request each deferment period.

Presidential Scholarships

First-time freshman applicants and transfers will receive consideration for Presidential Scholarships by applying and being accepted for admission by March 1st for the following fall term and meeting the minimum scholarship requirements. These scholarships are for full-time students only and may be renewed for up to four years. Award levels vary depending on each recipient’s academic record. For more information, go to www.oit.edu/scholarships.

Klamath County Scholarship

The Klamath County Scholarship is automatically awarded to any applicant living in Klamath County who will attend Oregon Tech. Students must complete entrance counseling and fill out a promissory note before funds will be disbursed. To complete these items go to www.studentloans.gov.

and subject to change. Contact the Oregon Tech Financial Aid Office for current interest rates. The difference between a subsidized and an unsubsidized loan is that the federal government pays the interest on subsidized loans while the student is in school. Students who wish to borrow through the unsubsidized loan program should remember that interest is accruing on the loan. Interest payments can be made while in school and during the grace period, but are not required. Any interest that has accrued at the time of repayment will be capitalized. Students must complete entrance counseling and fill out a promissory note.
Reciprocity Agreements

Students from some Northern California counties may be eligible to attend Oregon Tech under reciprocity agreements with College of the Siskiyous, College of the Redwoods, and Shasta College. Reciprocity can allow selected students to attend Oregon Tech at in-state tuition rates. Each participating college has certain restrictions, which may include the county of the student's residence, required enrollment for a period of time first at the community college, the student's major, and how many reciprocity permits the college issues.
Tuition and Fees

Snell 101
(541) 885-1235

Fees and deposits in all Oregon state institutions of higher education are charged according to a uniform plan, varying on different campuses according to differences in conditions or nature of coursework offered. The State Board of Higher Education reserves the right to make changes in fee schedules without notice.

Below is a partial list of the estimated fees paid by students regularly enrolled for undergraduate and graduate study. Payment of full-time fees entitles students to use the library. Students may receive medical attention from the Student Health Center, use the fitness center (Tech Fit Center) and other student services. No reduction in fees is made for students who do not wish to access these services.

The estimated fee schedule for the 2015-16 academic years is provided for planning purposes only. Fees are subject to change. The current fee schedule is available from the Business Office, Registrar’s Office or on the University’s website.

Special Fees

All special fees are subject to change without notice.

Application Fee (Not refundable)—$50
Must accompany admission application.

Matriculation Fee (Not refundable)—
$300 Undergraduate
$150 Graduate
A one-time fee assessed to all new Oregon Tech students.

PDF Transcript—$15

Petition to Graduate Fee—$56

Late Fee Payment—$99
Students paying fees after scheduled payment dates of any term can be charged a late charge of $99.

Late Fee to Add, Drop or Withdraw—$20

Return-of-Check Fee—$25
If institutional charges are met by a check which is returned because of any irregularity for which the student is responsible, a fine will be charged. The late-payment fee will be added to the returned-check charge where the returned check was used to pay tuition and fees.

Special Examination Fee, per credit—$50
Examination for credit.

Lifetime Transcripts—$40
A one-time fee assessed to all new and transfer students for a lifetime transcript request. Official Transcripts are issued at no charge.
PDF Transcript - $15.

Allied Health Curriculum Tuition
Tuition is assessed an additional 15 percent for courses specific to the Allied Health curriculums.

Engineering and Technology Differential Tuition
Tuition is assessed an additional 15 percent for students enrolled in Engineering and Technology programs.

Special Course Fees, per course
Special fees, in addition to regular tuition, are assigned for some courses. These fees are noted in the Schedule of Classes for each term.

Room and Board Costs
The 2015-16 estimated annual room-and-board costs range from $8,265 to $10,012, depending on room type and amount of food purchased. Room-and-board charges are assessed by term. Fees are due in accordance with the same fee payment schedule as exists for tuition. Generally, payments are due during the first week of the term.

Senior Citizen Instruction Fee
Per-credit hour: no charge.
Senior citizens are persons age 65 or older. Such persons are authorized to attend classes on a space-available basis. Charges for special materials, if any, are additional. Incidental fee privileges are not provided.

The senior-citizen privilege is extended to persons auditing classes (not seeking credit or working toward a degree).

Tuition and Fee Refunds
Students who withdraw from the university and who have complied with the regulations governing academic withdrawals may be entitled to certain refunds of fees assessed, depending on the time of withdrawal. The refund schedule has been established by the State Board of Higher Education and is on file in the Business Office. Included with the refund schedule is the mandated order in which financial aid must be returned to the appropriate programs for students on financial aid. All refunds are subject to the following regulations:

1. Any claim for refund must be made in writing before the close of the term in which the claim originated.
2. An official notice of withdrawal must be completed and necessary clearance signatures filed with the Registrar’s Office.
3. Refunds in all cases are calculated from the date of receipt of the application for refund or date of withdrawal, and not from the date when the student ceased attending classes, except in unusual cases when formal
withdrawal has been delayed through cause beyond the student’s control.

**Parking Fees**

All student, staff and faculty vehicles must be registered with the Traffic Commission and operated in compliance with **Regulations Governing Traffic Control**. At the time of vehicle registration, a parking fee will be assessed in accordance with a schedule approved by the State Board of Higher Education and filed with the Secretary of State. Parking permits may be purchased online via web-for-student. Vehicles must be registered by the first day after classes begin. Parking Fees for 2015-16 are:

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Faculty/Staff</th>
<th>Permits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permits</td>
<td>$102/year</td>
<td>$161/year</td>
<td>Add’l vehicle $10</td>
</tr>
<tr>
<td>Term</td>
<td>$51/term</td>
<td>$80/term</td>
<td>one-term and full-year permits</td>
</tr>
</tbody>
</table>

**Library Fines and Charges**

The following regulations govern library fines and charges:

1. **Books**—A fine of 25 cents per day is charged for each item overdue other than reserve books. No charges are made for the first three days late, but a charge of $1 is assessed on the fourth day, plus 25 cents per day thereafter (maximum, $10 each item). Separate charges apply to books borrowed from other libraries.

2. **Periodicals**—Magazines and newspapers have a $1-per-day charge for each overdue item up to the maximum overdue fine.

3. **Reserved books**—The following fines will be charged for violation of rules governing reserve books and other restricted materials: For overdue items, 25 cents for the first hour and 25 cents for each succeeding hour, or portion thereof, until the material is returned or reported lost. In case of flagrant rule violation, a charge of $1 per hour may be assessed, but in no case will a fine of more than $10 be assessed.

4. **Recalls**—Materials needed for use in the library are subject to recall at any time. A maximum fine of $1 per day may be imposed for failure to return promptly.

5. **Billing**—Borrowers failing to return materials within 40 days of the due date will be charged the replacement cost of the items plus the amount of fine (maximum fine—$10 each item) incurred up to the time the item is reported missing. In addition, the borrower will be assessed a service charge of $10.

6. **Refunds**—When a lost item for which the borrower has been billed is returned before replacement has been ordered, a refund not exceeding the replacement cost may be made at the discretion of the librarian. In cases where replacement has been ordered, no refunds to the borrower will be made.
Official School Catalog Addendum

I certify the current policy is true and correct:

The following individuals shall be charged the in-state rate, or otherwise considered a resident, for tuition and fees purposes:

• A Veteran using educational assistance under either chapter 30 (Montgomery G.I. Bill Active Duty Program) or chapter 33 (Post-9/11 G.I. Bill), of title 38, United States Code, who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of discharge or release from a period of active duty service of 90 days or more.

• Anyone using transferred Post-9/11 GI Bill benefits (38 U.S.C. § 3319) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of the transferor’s discharge or release from a period of active duty service of 90 days or more.

• Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship (38 U.S.C. § 3311(b)(9)) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of the Service member’s death in the line of duty following a period of active duty service of 90 days or more.

• Anyone described above while he or she remains continuously enrolled (other than during regularly scheduled breaks between courses, semesters, or terms) at the same school. The person so described must have enrolled in the school prior to the expiration of the three year period following discharge, release, or death described above and must be using educational benefits under either chapter 30 or chapter 33, of title 38, United States Code.

Signature: __________________________________________________________
Title: __________________________________________________________________
Institution: __________________________________________________________________

Signature of individual authorized to make official revisions to the catalog
Academic Policies and Procedures

Procedures and Regulations

Student Responsibility
Students are responsible for knowing and understanding Oregon Institute of Technology’s requirements relating to registration, academic standards, student activities and student organizations. A partial view of academic regulations is included in the class schedule introduction pages on Oregon Tech’s Web site and distributed to new students during their first registration at Oregon Tech. Students are encouraged to meet regularly with their departmental advisors and to contact the Registrar’s Office with questions about academic procedures, policies or regulations.

Academic Advising
Students are assigned faculty advisors from their academic programs. Advisors maintain a file on students’ progress and help them plan course loads. If a student should change programs, a new advisor will be assigned. Degree-seeking students are required to meet with their advisors prior to registration.

Student Classification
In the Oregon University System students are classified according to the number of college-credit hours earned as follows: 0-44, freshman; 45-89, sophomore; 90-134 junior; 135 and above, senior. Transfer credits are included in determining classification.

Quarter System
Oregon Institute of Technology operates on an academic year consisting of three quarters (or terms) of approximately 10 weeks each and a summer session of eight weeks.

Academic Progress and Petitions Committee
Administration of the regulations governing academic requirements is vested in the Academic Progress and Petitions Committee. This committee also has authority to assess probation or to suspend any student from the university when it appears that the student’s work is at such a level that the student cannot benefit by continued attendance. The university requires that students make substantial progress toward meeting graduation requirements, including maintaining a minimum 2.0 GPA. Any cumulative GPA below 2.0 is considered unsatisfactory and will bring the student’s record under review. Courses transferred in from other institutions are not included in institutional cumulative GPA.

The Academic Progress and Petitions Committee also serves as an advisory group to the Registrar’s Office regarding academic appeals. For information regarding appeals to this committee, students may contact the Registrar’s Office.

Admissions with Special Conditions
If a student is admitted with one or more stipulations and fails to meet any of the prescribed condition(s), that student may be referred to the Academic Progress & Petitions (AP&P) Committee for possible academic disciplinary action, up to and including probation and suspension from the university. The request for review by AP&P can be made by any member of the Admission Committee.

Academic Warning
An academic warning is a caution to the student that there is a lack of satisfactory academic progress. Students, including first term freshmen, who do not achieve a 2.0 in any given term will receive an Academic Warning. Students who have no earned credits, withdrawals (i.e., all Fs, withdrawals (W) and/or incompletes (I)), for two consecutive terms will also receive an Academic Warning.

Academic Probation
Students who have attempted two or more terms at Oregon Tech and have an Oregon Tech cumulative GPA below 2.0 will be placed on Academic Probation. Students who have no earned credits, (i.e. all Fs, withdrawals (W) and/or incompletes (I)), for three or more consecutive terms will also be placed on Academic Probation. Students placed on probation will receive notification that they are on Academic Probation as well as instructions on how to proceed. Once placed on probation, students are advised to limit their course load to 13 credits. Courses transferred in from other institutions are not included in institutional cumulative GPA.

Academic Suspension
Students on academic probation for one term who do not meet the 2.0 cumulative GPA requirement in the successive term of enrollment will be placed on Academic Suspension for at least one term. To reenroll, a student must complete the prescribed procedures and appeal to the Academic Progress and Petitions Committee for reinstatement. Students should contact the Registrar’s Office for reenrollment information. Students who have been suspended are denied all privileges of the institution.

Veteran students receiving benefits will lose all benefits until academic standing is improved to good standing.

Note: When a student is placed on academic warning, probation or suspension both the student and their advisor will be notified.

Summer Term
Anyone may enroll in summer term. Formal admission to the university is not necessary and there are no GPA or high school diploma requirements. High school students who want to take college courses are invited to attend. Potential students who have not met the college entrance requirements may take appropriate courses during the summer to correct these deficiencies. Students may register from early May through the first day of summer school. Tuition is on a per-credit basis.

The eight-week term begins in mid-June and ends in mid-August. Four-week sessions begin in mid-June and mid-July. Classes meet Monday through Thursday and are scheduled either during day or evening hours. Many summer classes are offered online via Oregon Tech Online.

A separate summer term class schedule is available on the web in April. This schedule provides a listing of courses, fees, registration and housing information.
Advanced Standing

Credit for Prior Learning
Credit for prior learning by a student admitted to Oregon Tech may be granted through a number of independent processes. These include: A) Transfer Credit; B) Military Credit; C) College Level Examination Programs (CLEP) and Advanced Placement credit (AP); D) Credit for National Registry or Licensure Exams; E) Credit by Examination; and F) Credit for Prior Experiential Learning. A number of these categories are for credit that is awarded for educational accomplishments attained outside of ac-credited post-secondary institutions.

These procedures describe the process used to grant the student appropriate academic credit by each of these methods as follows.

A. Transfer Credit
Oregon Tech makes every effort to give maximum consideration to the transfer work presented by enrolling students. To ensure that the student has the requisite knowledge, Oregon Tech follows these policies in determining credit:

Accreditation Status of Institution
The institution where the transfer credit was earned must be accredited by an accrediting body recognized by the Council for Higher Education (CHEA).

Students transferring work from an institution that is not accredited by a CHEA-recognized accrediting body may receive transfer credit by 1) demonstrating prior experiential learning with a portfolio, 2) applying for credit after demonstrating competencies in advanced coursework in the same subject area or 3) challenging courses by exam.

International Institutions
Students seeking transfer credit from international institutions must provide Oregon Tech with a credential evaluation from an Oregon Tech-approved credential evaluation service. Credential evaluation information may be obtained from the Office of Admissions. The credential evaluation must include course titles, credits and grades. Students must also provide course descriptions in English from the international institution. Any associated costs are the responsibility of the student.

Official Transcripts
Prior to the formal awarding of transfer credit, the transfer student must provide an official transcript of coursework completed at all other higher education institutions. Failure to list all colleges attended on the Application for Admission may result in denial of admission or transfer credit.

Admitted transfer students must submit official transcripts at least one term prior to enrollment to ensure timely evaluation of transfer credits.

Any student receiving GI Bill education benefits while attending Oregon Tech is required to obtain transcripts from all previously attended schools and submit them to the school for review of prior credit.

Determination of Transfer Credit
The Oregon Tech Registrar’s Office determines the transfer equivalency of general-education courses using articulation agreements, course descriptions, course outlines, and course syllabi. The student’s major department determines the transfer equivalency for technical or major courses using similar resources.

Articulation Agreements
Oregon Institute of Technology is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major with the least overlap or repeat of courses. Some agreements accept an associate degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform their major department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at www.oit.edu/articulations; students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the students’ academic department or the Office of Academic Agreements.

Applicability of Transfer Credit
Oregon Tech provides a complete, written transfer evaluation upon the admission of the student, prior to the planned term of enrollment. The evaluation delineates the transfer credit on a course-by-course basis and specifies direct course equivalencies, courses which may be used towards general-education requirements, elective credits and courses which do not receive credit.

At the time of admission, Oregon Tech’s written transfer evaluation may include elective credits that do not apply towards a specific degree. These credits will be recorded as transfer credit for registration purposes, allowing the student an earlier registration appointment based on total earned credit hours.

Some transfer work, which may not be directly equivalent to Oregon Tech courses, may be appropriately substituted to meet Oregon Tech requirements. Students may seek course substitution approval by completing the Course Substitution form and obtaining the signature of the advisor, department chair and University Registrar.

Credit for Alternative-Delivery Courses
Courses taken by alternative delivery from other accredited institutions will be evaluated as transfer credit.

Minimum Grade Standards
Oregon Tech considers for transfer those courses that carry a grade of D or better from an accredited institution. However, many Oregon Tech departments require C or better course grades for prerequisite and graduation purposes. Oregon Tech does not normally transfer math courses with a “D” grade.

Pre-College Level Transfer Credit
Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absentia are encouraged to obtain written pre-
approval of transfer credit to ensure transfer equivalency for degree purposes.

Pre-Approval of Transfer Credit
Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absence are encouraged to obtain written pre-approval of transfer credit to ensure transfer equivalency for degree purposes.

B. Military Credit
Oregon Tech will grant credit for military courses and experiences based on American Council of Education (ACE) guidelines (found in the Guide to the Evaluation of Educational Experience in the Armed Forces) and faculty recommendations. Credit is awarded in accordance with transfer credit policies at Oregon Tech and the Oregon University System. Students may request evaluation of military credit by furnishing an official AARTS or SMART transcript.

C. College-Level Examination Programs and Advanced Placement: College Level Examination Program (CLEP)
Oregon Tech will award credit for several college-level examination programs. These examinations must be completed with a satisfactory score and an original copy of test results must be forwarded to the Registrar's Office from the testing service. In order to receive such credit, the student must be admitted to an Oregon Tech degree program and registered for classes during the term in which the request is made. Oregon Tech awards credit for College-Level Examination Program (CLEP) subject examinations, but not for CLEP general examinations. Information on CLEP course equivalencies and minimum scores may be obtained from the Oregon Tech Registrar's Office.

Advanced Placement (AP)
Students who complete college-level work in high school under the Advanced Placement (AP) program must achieve a minimum score of three to be granted credit on their Oregon Tech transcript. AP course equivalencies may be obtained from the Office of Admissions or Registrar's Office.

A maximum of 25 percent of the credits used toward the degree may be CLEP and AP.

International Baccalaureate
Oregon Tech evaluates IB test scores much in the same way it evaluates AP scores. Students must have official test scores sent to the Office of Admissions. Oregon Tech may award credit to students who receive a 5 or higher on any Higher Level IB examination. No credit is awarded for Subsidiary Level exams. For more information, please contact the Registrar's Office at (541) 885-1300.

D. Credit for National Registry or Licensure Exams
Oregon Tech will award a pre-approved block of credit to fully admitted and enrolled students who have passed a national registry or licensure exam in majors offered by the institution. This award of credit is based on the academic department’s annual review of the national exam questions in comparison to the curriculum taught on campus. Full information is maintained in the Registrar's Office and via Oregon Tech Online, which coordinates online degree-completion programs offered by Oregon Tech.

Credit by Examination and Credit for Prior Experiential Learning
Oregon Tech awards credit for educational accomplishments attained outside of accredited postsecondary institutions.

E. Credit by Examination
Students currently enrolled at Oregon Tech may request credit for a course by special examination. This process is called a course challenge and the provisions are:

1. Credit by examination (course challenge) is available to students who have been admitted to Oregon Tech and received a grade other than an audit, or may they challenge the course before the last day to drop without a “W”.

2. No more than 25 percent of the credits submitted for graduation may be credit by examination.

4. Credit by examination counts toward graduation residency requirements. For a bachelor's degree, students must complete 45 credits at Oregon Tech with the last 15 to be taken on campus. For the associate degree, students must complete 30 credits with the last 15 to be taken on campus.

5. Examinations receive either a “P” (pass) or “F” (fail). A pass suggests the student has mastered the material comparable to a grade of “C” or better in the course being challenged. The University Registrar records “P” grades on the student transcript, but does not count the P in grade point average calculations. The University Registrar does not record “F” grades.

6. Students must pay a non-refundable per-credit fee, as published by the Office of Business Affairs, prior to the examination.

7. Departments are responsible for preparing an appropriate examination, evaluating the student's response and submitting results to the Registrar's Office. Departments reserve the right to declare any course offering as non-challengeable.

Further procedures and general guidelines for course challenges may be obtained from the Registrar's Office.

F. Credit for Prior Experiential Learning
Oregon Institute of Technology recognizes that students learn outside the classroom through experiences on the job, vocational education, professional development courses, workshops, and independent study. Oregon Tech may grant credit for experiential learning when it is judged to be equivalent to college-level courses in the Oregon Tech curriculum. This process is only appropriate for students who wish to demonstrate learning for more than one required course. Typically, credit for experiential learning will replace a series of major specific courses.
Level of Credit
Oregon Tech grants credit for prior experiential learning at the undergraduate level only. Credit will be awarded only for documented prior learning that has a balance, appropriate to the subject, between theory and practical application, and not just for prior experience. Credit should be appropriate to the academic context in which it is accepted.

Eligibility Requirements
The student must be fully admitted and enrolled at Oregon Tech. Credit will not be granted until the student has successfully completed the procedure outlined. Credit for prior experiential learning will not be granted if the student has already received credit for the same course. No more than 25 percent of the credits needed for a degree or certificate may be from credit for prior experiential learning. Credit may only be granted for courses offered by Oregon Tech and the university reserves the right to declare any course offering as inappropriate for prior experiential learning credit.

Awarding of Credit
Completion of the institution's review process does not guarantee a student will receive credit for prior experiential learning. If the student successfully demonstrates evidence of college-level learning, credit will be identified on the student's transcript as credit for prior learning. This credit will not be graded or counted in the student's grade point average. Students wishing to appeal the award of credit should appeal to the Provost, whose decision is final.

Tuition and Fees
Fees charged for portfolio assessment are based on the services performed. The application fee for a specified course is published by the Office of Business Affairs. This non-refundable fee must be paid prior to submitting the portfolio for assessment. Proof of payment must accompany the student's Credit for Prior Experiential Learning Application.

Transfer of Prior Experiential Learning Credit
Oregon Tech accepts credit for prior learning from other institutions, provided that the transfer institution awards such credit on the basis of standards similar to those outlined by the Northwest Association of Colleges and Universities (NWCCU).

Faculty Evaluator Qualifications
Credit is awarded based on the recommendation of teaching faculty who are qualified in the subject area, who have adequate training in portfolio evaluation and who are on regular appointment with the university on a continuing basis.

Procedure
Students seeking credit for prior experiential learning should first confer with their advisor to help assess if their experience and learning are appropriate for this process. If it is determined that experiential learning assessment is appropriate, the student should contact the University Registrar.

The University Registrar will determine whether the student has met the eligibility requirements outlined in this procedure. If so, the University Registrar and the Department Chair will sign the student's Credit for Prior Experiential Learning Application. The student must then complete a prior experiential learning documentation course. This course may be utilized for curricular requirements by the major department if appropriate.

Upon completion of the documentation course, the student will submit his/her Credit for Prior Experiential Learning Application and completed portfolio to the appropriate faculty evaluator as determined by the department chair. The faculty member will review the portfolio and if necessary will interview the student. Review of the portfolio will ensure that the learning experience demonstrates the theories, competencies, and outcomes of the academic subject matter. When appropriate, the faculty member may choose to consult with others who have expertise in the subject matter before making a decision as to whether or not to grant credit. The final decision is recorded on the student's Credit for Prior Experiential Learning Application and will be forwarded to the University Registrar. The Credit for Prior Experiential Learning Application will be included in the student's permanent academic record. The portfolio will be retained in accordance with Oregon Tech's archive guidelines.

Catalog of Graduation
The student must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled at Oregon Tech or from any subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is not more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed-upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum may no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override this catalog-of-graduation policy.

Baccalaureate Upper-Division Credit Requirement
Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.
Grading System

Student academic achievement is evaluated and reported in accordance with a system of letter grades assigned at the end of each course. These grades become part of the student’s transcript, a permanent academic record. A summary statement of a student’s total academic record is expressed as a cumulative grade point average (GPA).

Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student’s performance will be graded by the instructor and reported to the University Registrar as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Meaning</th>
<th>Points Per Credit Hour</th>
<th>Used to Calculate GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Exceptional</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>Superior</td>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>Average</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>D</td>
<td>Inferior</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>F</td>
<td>Failed</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>IP</td>
<td>In Progress</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>N</td>
<td>Audit</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>NP</td>
<td>No Pass:</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Equated to a “D” or “F”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Pass:</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Equated to a “C” or better</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>Withdrawn</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>Z</td>
<td>No Grade Assigned</td>
<td>0</td>
<td>No</td>
</tr>
</tbody>
</table>

Grade Change Policy

All grades except for ‘I’ and ‘IP’ are final when filed by the instructor during grade processing each term. Thereafter, a grade change may be made only in the case of clerical, procedural or calculation error. No grade other than ‘I’ or ‘IP’, once reported, may be revised by re-testing or by completing additional work. Any grade change by the instructor of record must take place within one year subsequent to the term in which the grade was reported. Any grade change by the instructor of record must take place within one year subsequent to the term in which the grade was reported. Any grade change that is to be filed later than one year must be approved by the appropriate College Dean and the Registrar.

Non-Standard Grading

Courses may be graded on the pass (P)/no pass (NP) basis at the discretion of the department and the University Registrar. Courses may include, but are not limited to seminars, externships, co-ops, independent study, certificate classes, and physical education.

Class Drop/Withdrawal Policy

A student may drop/withdraw from a course through Friday of the seventh week of the term. Although teaching faculty may drop a student during the first two weeks of the term, according to the Faculty Initiated Withdrawal Policy, they are not required to do so. Students will be notified of instructor-initiated drops in writing.

Faculty-Initiated Withdrawal Policy

Teaching faculty can drop a student during the first two weeks of the term from a class if the student has not attended by the second regularly scheduled meeting of that class. The student will be notified of the withdrawal in writing by the Registrar’s Office.

Student Initiated Drops/Withdrawals

1. During the first 10 days of the term, a student may drop one or more courses with no record. However, if a student withdraws from all courses, the student’s transcript will note “Complete Withdrawal.”

2. After the first 10 days of the term, a student who withdraws from one or more courses will receive a “W” for those courses. Students may withdraw from individual courses through Friday of the seventh week of the term.

3. After Friday of the seventh week, students will receive a letter grade (“A”, “B”, “C”, “D”, “F”, “P”, “NP”, “I” or “IP”) from the instructor.

4. Complete withdrawals from the university may be processed through Friday of the week prior to final-exam week. Depending on the time of the term, a complete withdrawal will result in a notation of a “complete withdrawal” or “Ws” on the student’s transcript.

5. Students requesting to withdraw from a course(s) after the published withdrawal dates that have medical documentation supporting the withdraw should contact the Dean of Student’s Office.

NOTE: The deadlines for dropping/withdrawing from a course are listed in the Academic Calendar.

Incompletes

When the quality of a student’s work is satisfactory, but some essential requirement of the course has not been completed for reasons acceptable to the instructor, a grade of Incomplete (I) may be assigned and additional time granted for completion. The instructor is responsible for submitting an “I” grade and completing the Request for Incomplete form and submitting it to the Registrar’s Office.

Grade Point Average

A student’s GPA is computed by assigning a numerical point value to each grade: “A,” 4 points per credit; “B,” 3 points per credit; “C,” 2 points per credit; “D,” 1 point per credit; “F,” 0 points per credit. GPA is the quotient obtained by dividing total grade points by total hours attempted. Grades of “I,” “P,” “NP,” “W” and “N” are disregarded in calculating GPA; however, a “P” is equivalent to a “C” or better. For example:

<table>
<thead>
<tr>
<th>Class #</th>
<th>Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Point Value for Credits</th>
<th>Earned Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
<td>3</td>
<td>B</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>ECO 201</td>
<td>Economics</td>
<td>3</td>
<td>C</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>MATH 111</td>
<td>College Algebra</td>
<td>4</td>
<td>A</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>CHE 101</td>
<td>Elementary Chemistry</td>
<td>3</td>
<td>B</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>CHE 104</td>
<td>Elementary Chemistry Lab</td>
<td>1</td>
<td>B</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>HED 250</td>
<td>Contemporary Health Issues</td>
<td>2</td>
<td>A</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>PHED 190</td>
<td>Racquetball</td>
<td>1</td>
<td>B</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

GPA = Sum of earned grade points = 54 = 3.18
Credits attempted 17
An “I” grade must be removed by the end of the next term (summer session not included). An “I” may only be extended under the most extenuating circumstances and then only for one additional term. If an “I” is not removed within the allotted time, the “I” then reverts to the alternate grade assigned by the instructor on the incomplete form.

Incomplete courses that are completed after the due date will be regraded at the instructor’s discretion. Grade changes must be submitted to the Registrar’s Office within three weeks after the end of the final term. Otherwise, the diploma will be delayed until the term during which all degree requirements are met.

In Progress (IP) Grade
The 'In Progress' grade is used for classes with coursework that continues past the end of the term in which the student is registered. Examples include externship, co-op, clinical and project classes. The 'IP' grade may be retained over multiple terms. ‘IP’ grades that are not changed during the allotted time revert to a grade of ‘F’ for undergraduate and graduate courses.

‘IP’ grades given at the undergraduate level will be retained for a maximum of four terms. The ‘IP’ grade for a specific graduate level course is maintained by the Registrar’s Office for a maximum of five years. Each year the student should file a progress report with the Graduate Council signed by the student and the student advisor. After five years, the student can appeal to the Graduate Council to request a grade change beyond this five-year limit. The Graduate Council has the authority to approve or deny the student’s petition.

No Grade Assigned (Z) Grade
The 'No Grade Assigned' grade is a grade assigned by the Registrar’s Office when no grade is reported by the instructor. A ‘Z’ grade should be changed by the instructor as soon as possible. If a ‘Z’ is not removed by the completion of the following term, the ‘Z’ reverts to a grade of ‘F’.

Repeat Policy
The following restrictions apply for course-repeat situations:

1. Students may attempt the same course (for a “W” or a letter grade) a total of four times.
2. Each withdrawal (“W”) is considered an attempt. Withdrawals, however, are not included in GPA calculations.
3. The new grade earned will replace the previous grade(s) when computing GPA. Only the first two earned grades will be excluded for GPA calculations. The last grade earned will be used on the petition to graduate.
4. All grades and credits remain on the student's official transcript.

NOTE: Students should consult with their financial aid counselor to determine financial eligibility for repeat courses.

Auditing Policy
A student has the option to enroll in a class for informational purposes only. This enrollment is classified as an audit and is regulated by the following procedures:

1. Audit classes are charged at regular tuition rates as printed in the class schedule.
2. The only grade an audit class may be granted is “N” (audit). The “N” grade is disregarded in the GPA and is not valid toward graduation requirements.
3. Class attendance shall be in accordance with the instructor’s attendance policy for all students in the class.
4. Instructors having audit students have no obligation to grade or record the audit student’s work.
5. An audit option may be requested during the registration period. Changes “to” or “from” the audit option may be requested no later than the 10th academic day of the term.
6. Students auditing a course may, at a later term:
   a. Register for the same course for credit.
   b. Challenge the course by examination.

Excessive Course Load
Admitted students are allowed to register for 21 credit hours (including audits) during an academic term without special permission. Fifteen credits are the maximum for summer session. Students wishing to register for an overload must have a 3.0 cumulative GPA and receive special approval from the advisor and the University Registrar. Appeals may be considered for special circumstances. The class schedule will provide associated tuition costs each term.

Non-admitted students are restricted to eight credits per term, with the exception of summer, where 15 credit hours are the maximum.

Substitution Within the Curriculum
Students desiring to depart from the curriculum prescribed in the catalog should contact their departmental advisor to begin the process. It is the responsibility of the student to file a petition with the Registrar’s Office for such changes. Substitution forms must be approved and filed prior to or with the petition for graduation in order to assure acceptability toward meeting graduation requirements.

Dead Week Policy
Dead Week (the period of Monday morning prior to finals week until the Monday morning of finals week) is the last week of regularly scheduled activities for the term. As such, Dead Week includes routine activities (e.g., lectures, discussions, laboratories, quizzes, assignments, appropriate course reviews, etc.).

1. Final examinations, when utilized, must be given at the scheduled time during finals week.
2. No student activities or athletic events will be scheduled during Dead Week.
3. Projects and/or examinations due Dead Week may not exceed 20 percent of the final course grade without giving students at least three weeks prior notice.

The appropriate vice president must approve any exceptions to this policy.

Final Exams
All teaching faculty will meet their classes during finals week at the final-examination time designated in the official class schedule issued at the beginning of each term.

1. No student activities or athletic events will be scheduled during finals week.
2. Methods of evaluation are at the discretion of the instructor. They should be specified in the course syllabus and distributed to students the first week of class.
3. Faculty who use a final examination will administer that exam at the time designated in the official class schedule. Finals times are designed not to conflict.

Individual students may request exceptions to this policy. These must be approved in advance by the instructor.
Course instructors may request exceptions to this policy. The exception must be approved by the dean of the school and students should be given at least three weeks prior notice of the change.

**Academic Forgiveness**

The Academic Forgiveness policy allows undergraduates with an unsatisfactory GPA to drop a maximum of three consecutive terms of work from consideration in their GPA. Academic forgiveness applies to terms only. Students are not allowed to select courses within terms for forgiveness.

Academic forgiveness is granted on a case-by-case basis by the Academic Progress and Petitions Committee. It is an extreme measure; it may be granted only once and only when a student provides clear and convincing evidence of a renewed commitment to advancing his or her education. Once forgiveness is granted, it may not be revoked. Forgiveness can be applied only to credits earned at Oregon Tech.

If the petition is approved, the student’s transcript will have a notation stating, “Academic Forgiveness Granted” above each term in which forgiveness was granted. Forgiven courses and grades are no longer calculated in the GPA and do not apply toward graduation. However, a record of all coursework will remain on the transcript.

**Eligibility**

To apply for consideration for academic forgiveness a student must:

1. Have earned less than a 1.0 term GPA for the term(s) being considered for forgiveness. The term(s) for which forgiveness is being requested must have been taken at least seven years prior to the request;
2. Have had at least a two-year lapse in enrollment at Oregon Tech;
3. Be currently enrolled at Oregon Tech;
4. Have completed a minimum of 30 graded credits at Oregon Tech with minimum cumulative GPA of 3.0 or better since resuming studies at Oregon Tech;
5. Apply for forgiveness with the Academic Progress and Petitions Committee before degree completion.

**Procedure**

To apply for academic forgiveness, a student must submit a formal letter of request to the University Registrar, which must include:

1. Specific term(s) (maximum of three consecutive) for which forgiveness is being requested;
2. Statement of academic goals and a term-by-term plan for degree completion signed by the student’s academic advisor;
3. Rationale for the request.

The University Registrar will forward the application to the Academic Progress and Petitions Committee for review and will notify the student of the Committee’s decision.

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**Application for Graduation**

Students must file an Application to Graduate at least two terms prior to the term of graduation. These forms are available online at www.oit.edu/registrar, at the Registrar’s Office, in the Wilsonville Programs offices and in academic departments. They are submitted to the Registrar’s Office for evaluation.

Oregon Tech Wilsonville students must schedule a graduation degree-check appointment with their major’s program director at least two terms prior to graduation. The final graduation check is completed by the Registrar’s Office at the Klamath Falls campus.

**Sealing of a Degree**

All grade changes, removals of incompletes, and transfer work necessary for completion of degree requirements must be on file in the Office of the Registrar by the Friday following the end of the term of graduation. Academic records are sealed ninety days after the conferral of a degree: no changes to the record will be made following that date.

**Graduation Residency Requirements**

All degrees require students to take a minimum number of Oregon Tech courses. For an associate degree, a minimum of 30 term-credit hours must be taken from Oregon Tech. For a bachelor’s, a minimum of 45 term-credit hours must be taken from Oregon Tech. Credits earned through Oregon Tech course challenge or the Oregon Tech Credit-for-Prior-Learning program are considered resident credits toward graduation requirements. All other credits granted by examination (CLEP or AP) or other methods are non-resident credits. Students desiring to complete course requirements for graduation from Oregon Tech at another college or university must receive prior approval from the Registrar’s Office.

**Catalog of Graduation**

Students must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled or from any subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is no more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum can no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override the catalog of graduation.

**Baccalaureate Upper-Division Credit Requirement**

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor’s-degree-granting institution.
Multiple Majors
An undergraduate student may earn multiple majors if all the degree requirements for each major are met. All successfully completed majors will be listed on both the transcript and diploma.

Concurrent Degrees
Students may be granted a second bachelor's degree provided they meet the requirements for both degrees and complete an additional 36 credits beyond the requirements of the first degree. 45 credits are required if the first degree was not granted by Oregon Tech and students must meet the general-education requirements as outlined in their catalog of graduation. If the first bachelor's degree was granted by Oregon Tech, the general education requirements are waived for the second degree.

Curricular Requirements
Curricular requirements are determined by, and vary with, the departments involved. Major requirements are published in this catalog.

Minors
A minor consists of a minimum of 18 credits in a subject field outside the student’s major. The total credits required for a minor depend on the academic discipline, the prerequisites of the required courses and the student’s starting level in the discipline. Requirements for approved minors are listed by department in this catalog. Minors will only be granted at the time students receive their baccalaureate degrees. Application for a minor must be submitted to the University Registrar with the student's petition to graduate.

Course Substitutions
Students may seek course substitution approval by completing the Course Substitution form and obtaining the signature of the advisor, department chair and University Registrar. Course substitutions for general-education requirements must satisfy the same category of general education requirement. For example, a humanities course specified in this catalog.

Graduation in Absentia
Students wishing to complete the Oregon Tech degree by attending another college and transferring work after the minimum residency credits have been met (30 for associate and 45 for bachelor’s degree) must complete a Petition to Graduate and have the final transferring classes approved for their degree by the transcript evaluator in the Oregon Tech Registrar's Office. This should be done prior to leaving Oregon Tech and beginning at the other college.

Commencement
Oregon Tech’s graduation ceremony is held in June each year at which time degrees are granted to all who have satisfactorily completed all major and university general education requirements during the preceding spring term. Summer, Fall and Winter term graduates who have already received diplomas may also participate in Commencement.

Students who demonstrate the ability to graduate in the following summer term may also participate in Commencement ceremonies. However, summer graduates will not receive academic honors or diplomas at the spring commencement.

Diplomas
Oregon Tech awards diplomas at Commencement based on preliminary grades and preliminary degree checks for Spring-Term graduates. Students who receive a diploma at Commencement, but do not subsequently complete degree requirements, will be notified after the final degree check. The student will be asked to return the diploma. The university will place a hold on the student’s registration privileges and transcript if the diploma is not returned.

Those students with estimated failing or incomplete grades will receive a letter, rather than a diploma, inside the diploma cover. After completion of all degree requirements, these students will receive their diplomas in the mail. Diplomas will also be held until all fees and charges due Oregon Tech have been paid and exit interviews have been completed for Federal, Perkins and institutional loans.

Academic Honors
At each Commencement, Oregon Tech recognizes academically outstanding students who will receive their bachelor's degree with academic honors. This honor is based on all Oregon Tech courses. To be eligible for honors a student must complete a minimum of 75 Oregon Tech GPA hours/credits.

Academic honors are based on the following criteria:

- Cum Laude
  Graduation with honors
  3.50-3.74 GPA

- Magna Cum Laude
  Graduation with high honors
  3.75-3.89 GPA

- Summa Cum Laude
  Graduation with highest honors
  3.90-4.00 GPA

Note: Students who do not have 75 Oregon Tech credits and who are graduating from a Degree Completion program must complete a minimum of 45 graded Oregon Tech credits to be eligible for honors. For Degree Completion students, who fall into this category, honors are based on all Oregon Tech courses and transfer courses used for the degree.

Honors recognized at the graduation ceremony do not include grades from the term immediately preceding Commencement. After final grades are posted, the honors standing of some students may change. These students will be notified. A student’s final honors standing will be posted on the official transcript.

Only past and spring honors are recognized at commencement, both in the program and with honor cords. Summer graduates will have honors listed on their diploma and official transcripts upon completion.

Academic Term Honors

- President's List (Applicable to full-time undergraduate students only)
  Each term, students with a GPA of 3.70 or better are included on the President's List.

- Dean's List (Applicable to full-time undergraduate students only)
  Each term, students with a GPA of 3.30-3.69 are included on the Dean's List.

Honors

Special Recognition
Each spring a number of Oregon Tech graduates will be selected for membership in national honor societies. Honor society members can be identified by a distinctive honor cord worn over the shoulder at Commencement.
Baccalaureate General Education Requirements

General Education Requirements
Oregon Tech’s General Education requirements provide breadth and depth to the Oregon Tech educational experience. The requirements are designed to help students widen perspectives, explore relationships between subjects and develop critical and analytical thinking skills in areas integrated with a student’s major. General education provides the core of an undergraduate university education. These courses help students make progress toward becoming educated persons and provide a foundation for lifelong learning.

Through general education at Oregon Tech, students study broad topics, principles, theories and disciplines. The courses are organized within the curriculum in such a manner that students will acquire knowledge, abilities and appreciation as integrated elements of the educational experience. In addition, general education courses teach students to communicate clearly, think critically and globally, define and solve problems within and across disciplines, calculate logically and apply scientific reasoning. No matter what their disciplines, calculate logically and apply scientific reasoning. No matter what their major, students will benefit from studying areas of knowledge that help them become competent, well-rounded professionals as well as well-educated human beings and citizens.

The General Education Advisory Council and Oregon Tech’s faculty review the general education curriculum regularly. Oregon Tech’s goal for General Education is to help students become literate, informed, critical participants in a diverse and rapidly changing global society.

All students must complete the university general education requirements as listed in the curriculum map for the major and in this catalog. If a student holds a baccalaureate degree or higher from a recognized, accredited institution, as determined by Oregon Tech, the Oregon Tech general education requirements for the Oregon Tech baccalaureate may be waived subject to departmental program requirements.

Transfer students entering Oregon Tech who have earned either an Associate of Arts Oregon Transfer degree (AAOT) or an Associate of Science in Business degree (ASOTB) from an Oregon community college will be considered as having met Oregon Tech’s lower-division general education requirements.

* Remedial or developmental courses, including MATH 100 and WRI 115, cannot be used for graduation.

Communication
SPE 111 Public Speaking
WRI 121 English Composition
WRI 122 Argumentative Writing
Plus 9 credits from the following list: COM 205, COM 225, COM 320, COM 347, COM 401, COM 402, SPE 314, SPE 321, WRI 123, WRI 214, WRI 227, WRI 327, WRI 328, WRI 350, WRI 410.

Humanities
9 credits selected by student or specified by a major department from the following: ART—Art; HUM—Humanities; LIT—Literature; MUS—Music; PHIL—Philosophy; Languages (second year). Other transfer courses, defined as “humanities” by the Registrar’s Office, may be used in this category. No more than three credits of activity or performance-based courses may be used in this category.

Social Science
12 credits selected by student or specified by major department from the following: ANTH — Anthropology; ECO — Economics; GEOG — Geography; HIST — History; PSCI Political Science; PSY — Psychology; SOC — Sociology. Other transfer courses, defined as “social science” by the Registrar’s Office, may be used in this category.

* ANTH 101 may not be used to satisfy both Social Science and Science credits.

* GEOG 105 and GEOG 115 may not be used to satisfy Social Science credits.

Technology
Specific requirements for demonstrating computer proficiency may be established by the academic department.

Science/Mathematics
One, four credit college-level mathematics course for which at least intermediate algebra is the course prerequisite.

Plus 12 credits selected by student or specified by major department from biological sciences (BIO, CHE), mathematics (MATH), statistics (STAT 412, 413, 415, or 431), physical sciences (PHY), physical geosciences (GEOG 105 or GEOG 115) geology (GEOL) or physical anthropology (ANTH 101). Other transfer courses, defined as “Science/Mathematics” by the Registrar’s Office, may be used in this category. At least four credits must be completed from a laboratory-based science course in BIO, CHE, GEOG, GEOL or PHY.

Baccalaureate Upper-Division Requirement
Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor’s-degree-granting institution.

Bachelor of Science Degree
The Bachelor of Science degree requires the student to opt between completion of 36 credits in mathematics and science or 45 credits in mathematics, science and social science. Students placed at a higher beginning level of mathematics than is published in the curriculum of their major may choose to substitute those mathematics credits surpassed by their accelerated level of placement with electives from any department to attain the required number of general education credits required by the university for graduation.

Intercultural Studies
Students are encouraged to select at least one class from the following lists of intercultural courses. These courses also satisfy general education requirements.
Humanities: LIT 266 Native American Literature and Film; LIT 235 American Multicultural Literature, LIT 381 Contemporary World Literature; HUM 147 Western Culture in the Classical Age, HUM 148 Western Culture in the Medieval Age, HUM 149 Western Culture in the Modern Age


**Deficient Foreign Language (DFL)**
Students who graduated from high school in 1997 or after, who did not complete two years of the same foreign language in high school with a C- or better, must complete two terms of the same college-level foreign or second language with a C- or better in order to receive an Oregon Tech degree.
University Departments and Programs
Clinical Laboratory Science Program

Dawn Taylor, Department Chair
Cara Calvo, CLS Program Director
Assistant Professors: C. Calvo, T. Mundy, D. Taylor, T. Wolfe
Associate Professor: A. Furman
Adjunct Faculty: The program utilizes faculty physicians and faculty medical laboratory professionals at Oregon Health & Science University (OHSU) and community medical, research, and public health laboratories.

Early Admission CLS Program (EACLSP) Advisors: Cara Calvo and Deb Disko (Wilsonville), Rosalind McClure (Klamath Falls)

Degree Offered
Bachelor of Science in Clinical Laboratory Science (joint degree between Oregon Tech and OHSU)

Oregon Tech, in partnership with OHSU, offers a course of study leading to a Bachelor of Science in Clinical Laboratory Science degree. Students take coursework that combines a rigorous competency-based science curriculum with community-sponsored clinical training. Graduates are prepared to enter the medical laboratory science profession and to pursue career opportunities in various laboratory settings including medical, research, and public health. Students who successfully complete the degree program are eligible to take the Medical Laboratory Scientist (MLS) national board certification examination offered by the American Society for Clinical Pathology (ASCP).

Accreditation
The Clinical Laboratory Science professional program is accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS), 5600 North River Road, Suite 720, Rosemont, Illinois 60018-5119. (773) 714-8880

Mission Statement
The mission of the Oregon Tech • OHSU Clinical Laboratory Science Program is to educate, train, and graduate professionally competent and ethical individuals, committed to life-long learning, and who are prepared to meet current and future workplace challenges in medical laboratory science.

Program of Study
During the first three years or pre-professional phase of study, students complete a minimum of 103-quarter hours that includes (a) 55-quarter hours of general education coursework, including two college-level math courses, one of which must be statistics; (b) 24-quarter hours of biology requisites that must include one microbiology course and one immunology course; and (c) 24-quarter hours of chemistry cognates. Additionally, to receive an Oregon Tech degree, students who graduated from high school in or after 1997 but who did not complete two years of a foreign language in high school with a C- or better must complete two terms of college-level second language coursework.

Through an application process students are selected to enter the fourth year of study or the professional program. NOTE: Oregon Tech Early Admission CLS Program (EACLSP) students who complete EACLSP requirements are automatically admitted to the CLS professional program. For more information on the Early Admission CLS Program, contact the Department of CLS program office at (503) 821-1146 or EACLSP advisor Rosalind McClure on the Klamath Falls campus at (541)-885-1525.

The CLS professional program is admission-restricted and 15 months (5 consecutive terms) long, beginning in September of the academic year in which a student is admitted and ending in December of the following year. Admitted students spend four quarters completing clinical laboratory science-specific coursework on the Oregon Tech Wilsonville campus. Upon successful completion of the on-campus work, students are assigned to one or more program-affiliated laboratories to complete an extended fifth term (16 weeks) of clinical training. During clinical training, students spend 40 hours per week applying knowledge and skills to perform a wide variety of testing in a contemporary, accredited medical laboratory and to further develop discipline-specific competency under supervision of clinical instructors. Currently, the Department of CLS maintains affiliations with accredited laboratories in Oregon, Washington, Idaho and Nevada.

Students admitted to the CLS professional program are guaranteed placement for their clinical training subject to the following policies and procedures:

1. Due to the variable availability of training sites year to year and the nature of contractual agreements with affiliated training sites, student placement at a specific site may not be possible. Therefore, placement of students for clinical training is determined by the program in consultation with clinical affiliate training sites.
2. Before beginning clinical training, students must comply with all training site and Oregon standardized administrative requirements including but not limited to immunizations, screening (e.g., background check, drug screen, etc.), trainings (e.g., safety, CPR, etc.), and proof of health insurance coverage valid for the entire clinical training period.
3. All academic and non-academic requirements must be met to the satisfaction of program faculty before a student is permitted to start clinical training.
4. Students are solely responsible for transportation and housing needs associated with their clinical training placement.

Professional Program Application and Admission Requirements
The professional program admits one cohort of students a year. Except for EACLSP students, all prospective students must submit completed applications from September 1st to December 31st of the preceding year for which an applicant seeks admission. Students can download application instructions and the application forms from URL http://www.oit.edu/wilsonville/academic-degrees CLS how-to-apply. Importantly, transfer and post-baccalaureate students must also submit a separate application for admission to Oregon Tech. Prospective students may apply online at URL http://www.oit.edu/wilsonville/admissions. When asked, applicants should select "Pre CLS" as their major. Applications received by the CLS Department will not be considered if an Oregon Tech admissions application is not on file with the Oregon Tech Admissions’ office. NOTE: Admission to Oregon Tech does not mean that an applicant has been admitted to the CLS professional program.
Admission to the professional program is criterion-based, competitive, and decided by the program admissions committee. Admission selection is based upon scholarship, personal qualifications, recommendations from three references, and interview results. Selected candidates are interviewed in February and applicants selected for admission are notified in writing by the Program Director during March. To be eligible for admission, candidates for the CLS professional program must meet the following minimum eligibility requirements:

1. Those applicants who have earned a Baccalaureate degree must have completed a minimum of 103 transferable quarter credit hours to include:
   - **Mathematics:** one college-level math course. Minimum requirements are met by MATH 111 College Algebra. **Additional required math course:** statistics.
   - **Biology:** 24-quarter credit hours that must include one course in immunology and a course in microbiology. The microbiology coursework must include a laboratory component either integral to the course or taken separately; courses must be at the 200-level or above and not survey type. **Additional highly recommended courses:** general biology, genetics, anatomy and physiology, cellular or molecular biology.
   - **Chemistry:** 24-quarter credit hours of chemistry; courses must be at the 200 level or above and not survey type. **Highly recommended courses:** general chemistry, organic chemistry, biochemistry, and quantitative analysis; and either two years of high school foreign language or two terms of college-level foreign language.

2. Those applicants who have not earned a Baccalaureate degree must have completed a minimum of 103 transferable quarter hours to include the prerequisites listed in 1 above and:
   - 18-quarter credit hours of Communication course work including specified course work in writing and speech (see Baccalaureate General Education Requirements described elsewhere in this catalog);
   - 9-quarter credit hours of Humanities course work in topical areas such as Art, Art History or Appreciation, Music, Music History or Appreciation, English (excluding writing and speech), Linguistics, and Philosophy (no more than three credits of activity of performance-based courses may be used in this category); and
   - 12-quarter credit hours of Social Science course work in topical areas such as Anthropology, Economics, Geography, History, Political Science, Psychology, and Sociology.

Praerequisite course work does not need to be completed to apply, but official transcript(s) documenting completion of all outstanding prerequisite coursework with grades of ‘C’ or better must be on file with the CSL Department office before any offer of admission is finalized. The Oregon Tech Registrar’s office will review each applicant’s transcripts to confirm that the requirements are met. Applicants who have met admission requirements seven or more years prior to application to the CSL Program must complete additional academic work to qualify. This may be accomplished by:

   - Completing a course in chemistry and a course in biology with a grade of C or better; courses must be at the 200 level or above and not survey type; or
   - Receiving credit by examination in biochemistry and in microbiology; or
   - Achieving a CLEP score at or above the 50th percentile on both the biology and chemistry examinations.

Applicants seeking transfer credit from international institutions must provide a credential evaluation from an Oregon Tech-approved credential evaluation service and must meet requirements as described in two above. Contact the Oregon Tech Office of Admissions on-line at http://www.oit.edu/admissions/international-students or by telephone 503.821.1250 or 1.800.422.2017 for additional information.

   • All applicants must have a minimum GPA of 2.5 to apply.

Oregon Tech Freshman Advantage: The Early Admission CLS Program

Oregon Tech students who have completed their freshman year in good academic standing may apply to the Early Admission Clinical Laboratory Science Program (EACLSP).

**NOTE:** Students with fewer than 60 credits of pre-professional CLS program coursework to complete are not eligible for the Early Admission CLS Program.

EACLSP students who meet the following minimum eligibility requirements are automatically admitted to the CLS professional program:

1. At the time of application to the EACLSP, a student must be enrolled at either the Klamath Falls or Wilsonville Oregon Tech campus with at least sophomore standing; and
2. A EACLSP-track student must carry a minimum of 12-credits at Oregon Tech per term; and
3. Complete all pre-professional CLS program coursework with grades of “C” or better; and
4. Earn a minimum GPA of 3.00 in each term; and
5. Maintain a cumulative GPA of at least 3.25 in each term; and
6. Adhere to the Student Life Policies and Regulations and the Oregon Tech Academic Regulations - see the Oregon Tech General Catalog and Oregon Tech Student Handbook;
7. Job-shadow a minimum of 10 hours in an approved medical laboratory setting;
8. Attend one ‘meet-the-faculty’ event on the Wilsonville campus while in the EACLSP;
9. Complete CLS 100 Introduction to Clinical Laboratory Science with a grade of “B” or better; and

**Essential Requirements**

In accordance with its accreditation standards, the CLS program has established essential requirements. To be admitted and maintain enrollment, participate in, and successfully complete the CLS professional program, a student must meet these non-academic standards of performance:

A. Students must demonstrate the ability to acquire and to communicate information. Specifically, a program student must be able to:

1. Read for comprehension and follow verbal and written instructions to demonstrate mastery of information
presented in coursework, including relevant content in basic science and clinical courses, at a level deemed appropriate by the faculty.

2. Effectively communicate in written and spoken English in order to transmit information to faculty, staff, peers, and members of the healthcare team.

3. Make a correct judgment in seeking supervisory help and consultation in a timely manner.

4. Competently utilize technology to research, investigate, acquire and present information obtained by observation and experimentation.

5. Use strategies that minimize miscommunication.

6. At all times and in all circumstances, follow established procedures to safeguard protected patient information communicated by non-electronic and electronic means.

B. Students must demonstrate sufficient motor and sensory function to execute movements required to carry out work assignments in all phases of diagnostic testing, including preanalytical, analytical, and postanalytical. Specifically, a program student must be able to:

1. Distinguish the physical and/or chemical attributes, including color, shape, and size, of objects both macroscopically and microscopically.

2. Demonstrate sufficient dexterity to safely manipulate specimens, laboratory utensils, tools, equipment and instrumentation including computer touch-screens, keyboards and handheld calculators, necessary to obtain and report complete and accurate diagnostic test results.

3. Demonstrate adequate mobility to attend to duties in the various locations of the medical laboratory work environment.

4. Use sensory skills to acquire and apply information presented by various means and media, including demonstrations.

5. Perform sustained, often repetitive physical activity that may require sitting, standing and/or walking for prolonged periods of time.

6. Accurately read, record, and when necessary, respond to numbers, letters and symbols displayed in print whether transmitted through non-electronic, electronic or other technological media.

7. Demonstrate proficiency performing a wide range of tests in areas of the contemporary medical laboratory including but not limited to hematology, clinical chemistry, immunohematology, and microbiology, molecular and other emerging diagnostic venues.

C. Students must project an image of professionalism through behavior, speech, and grooming. Each student is to possess requisite knowledge and skill and safely perform a wide variety of test procedures with precision and accuracy. Specifically, a program student must be able to:

1. Follow established laboratory safety protocols when working with various sample types including blood, urine, and other body fluids and tissues, and with microbial organisms that may be infectious, and hazardous chemicals.

2. Work accurately and safely under stress and time constraints, and make subjective evaluations and decisions when mistakes may have a negative and/or high impact on patient care.

3. Adapt to changing environments, maintain a professional demeanor and concentration in distracting situations.

4. Demonstrate attributes that include integrity, responsibility, and tolerance.

5. Speak, act and perform all work in an ethical manner.

6. Show respect for self and others.

7. Work independently as well as cooperatively with others, performing professional obligations in a timely, responsible manner.

8. Prioritize tasks and accept responsibility for work performed independently and as a team member.

9. Assess his or her performance, willingly accept criticism, and actively seek ways to improve.

Graduation Requirements
BS CLS degree students must complete 200 quarter credits hours, maintain a minimum GPA of 2.00, and earn a grade of “C” or better in all professional program courses (CLS) as prescribed by the curriculum outline.
Bachelor of Science in Clinical Laboratory Science Curriculum

All senior level courses require admission to the Clinical Laboratory Science Program or instructor consent. Required courses and recommended terms during which they should be taken:

Pre-Clinical Laboratory Science (121 credits)

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Credit</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
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<td>200-level General Biology I</td>
<td>4</td>
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** Junior Year

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<td>CLS 415 Clinical Chemistry I</td>
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<td>CLS 420 Clinical Immunology</td>
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<td>CLS 432 Foundations of CLS I*</td>
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<td>CLS 464 Medical Mycology &amp; Virology</td>
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<tr>
<td>CLS 474 Medical Parasitology</td>
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| **Senior Year**              | **Winter** |
| CLS 416 Clinical Chemistry II | 6      |
| CLS 442 Hematology I        | 6      |
| CLS 444 Clinical Microbiology I | 6  |
| CLS 462 Foundations of CLS II | 2      |
| **Total**                  | **20**  |

| **Senior Year**              | **Spring** |
| CLS 422 Molecular Diagnosis Methods | 3  |
| CLS 443 Immunohematology I   | 4      |
| CLS 445 Microbiology II      | 4      |
| CLS 452 Hematology II       | 5      |
| **Total**                  | **16**  |

| **Senior Year**              | **Summer** |
| CLS 417 Clinical Chemistry III | 2      |
| CLS 424 Hemostasis           | 3      |
| CLS 449 Principles of Urinalysis | 3  |
| CLS 453 Immunohematology II  | 2      |
| CLS 457 Advanced Chemistry/ Immunology Concepts | 2  |
| **Total**                  | **12**  |

| **Senior Year**              | **Fall** |
| CLS 463 Foundations of CLS III | 1      |
| CLS 470 Chemistry and Immunology Externship | 4  |
| CLS 471 Hematology Externship | 4      |
| CLS 472 Microbiology Externship | 4     |
| CLS 473 Immunohematology Externship | 3  |
| **Total**                  | **16**  |

**May be taken in junior year

Total Credits Required for B.S. Clinical Laboratory Science: 200
Emergency Medical Services Department

Department Chair: Jamie Kennel
Program Director Paramedic Program: Jamie Kennel
Medical Director: Todd Ellingson
Assistant Professor: H. Jarrard, J. Kennel
Instructors: K. Darling, C. Hamper, S. Schmidt, A. Wagner

Degrees Offered
Associate of Applied Science (AAS) in Paramedic (joint degree through Oregon Tech and OHSU).
Bachelor of Science (BS) of Emergency Medical Services Management (joint degree through Oregon Tech and OHSU).

Career Opportunities
The EMS department provides a full spectrum of pre-hospital training programs and degrees, jointly offered by OHSU and Oregon Tech, starting from your very first EMS or general education course all the way through to completing your bachelor's degree, all created with collaboration from local and national industry leaders including:

- Emergency Medical Technician (EMT) Training and Certification
- Paramedic Training (AAS degree & Nationally Accredited)
- Critical Care Paramedic Training
- Community Care Paramedic / Mobile Integrated Healthcare Training
- EMS Management (Bachelor's degree)

Depending on your career aspirations, graduates find career employment in a variety of settings including ambulance transport agencies, fire and rescue agencies, air-medical transport agencies, medical support for industrial sites, tactical-medical teams, hospitals, and international aid missions, to name just a few.

The EMT and Paramedic program prepares students for entry positions in the pre-hospital medicine profession. Upon successful completion of the program, graduates are eligible to sit for the National Registry examination, which can lead to both national and state certifications.

Accreditation
While all programs at the university are accredited by the Northwest Commission on Colleges and Universities (NWCCU), where it is available and adds value to our students, our EMS programs offer additional programmatic accreditation. The Paramedic program is nationally accredited by The Commission on Accreditation of Allied Health Education Programs (www.caahep.org) upon the recommendation of the Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions (CoAEMSP).

Admission Requirements
All courses offered by the EMS department require only general Oregon Tech admission with one exception: the second year of the Paramedic degree. Due to the large number of applications and relatively limited number of student positions, the second year of the paramedic degree is a competitive application process requiring a separate admissions step, further described on the Oregon Tech website (www.oit.edu/paramedic).

Whether you’re an incoming freshman or preparing to transfer into one of our programs, students have been most successful when they focus and excel in the following three areas:

- Strong academic performance overall with an emphasis on science coursework performance
- Experience in providing pre-hospital care (e.g. volunteer, intern, BLS transports, etc.) ideally with hands-on direct patient care
- Strong customer service experience with the public

All prospective students are encouraged to meet with the EMS department Program Coordinator to review transcripts and develop a customized plan to get started.

Curriculum
The following are required courses and recommended terms for students wishing to meet the AAS and BS degree requirements. All courses listed on the curriculum map in the catalogue year a student begins a program must be fulfilled for graduation eligibility.
## Associate of Applied Science in Emergency Medical Technology–Paramedic

### Curriculum

Required courses and recommended terms during which they should be taken:

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<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
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<tr>
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<td>BIO 231</td>
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<td>EMS 151</td>
<td>Emergency Medical Technician I</td>
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<tr>
<td>HED 260</td>
<td>Diet &amp; Exercise for Lifetime Fitness</td>
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<td>Basic Electrocardiography</td>
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**Total Credit Hours for A.A.S. Degree in EMT–Paramedic:**

- Technical Credits Total: 65
- Degree Credits Total: 109
Bachelor of Science in Emergency Medical Services Management

Curriculum

Required courses and recommended terms during which they should be taken:

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### Paramedic Professional Courses (Additional Application Required)

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#### Junior Year

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<tr>
<td>BUS 317</td>
</tr>
<tr>
<td>BUS 357</td>
</tr>
<tr>
<td>ECO 201</td>
</tr>
<tr>
<td>WRI 227</td>
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<table>
<thead>
<tr>
<th>Winter</th>
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<tbody>
<tr>
<td>BUS 316</td>
</tr>
<tr>
<td>EMS 496</td>
</tr>
<tr>
<td>EMS 456</td>
</tr>
<tr>
<td>MATH 362</td>
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<tr>
<td>BUS 467</td>
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<tr>
<td>EMS 497</td>
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<tr>
<td>EMS 444</td>
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<td>Math, Science, or Social Science Elective</td>
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Total Credits Required for B.S. in Emergency Medical Services Management Critical Care Track: 190
Bachelor of Science in Emergency Medical Services Management – Community Care

Curriculum

Required courses and recommended terms during which they should be taken:

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIO 200: Medical Terminology</td>
<td>Fall</td>
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<tr>
<td>BIO 231: Human Anatomy and Physiology I</td>
<td>Fall</td>
<td>4</td>
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<tr>
<td>EMS 151: Emergency Medical Technician I</td>
<td>Fall</td>
<td>6</td>
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<tr>
<td>MATH 111: College Algebra</td>
<td>Fall</td>
<td>4</td>
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<tr>
<td><strong>Total</strong></td>
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<thead>
<tr>
<th>Course</th>
<th>Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIO 232: Human Anatomy and Physiology II</td>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>EMS 152: Emergency Medical Technician II</td>
<td>Winter</td>
<td>6</td>
</tr>
<tr>
<td>SPE 111: Public Speaking</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>WRI 121: English Composition</td>
<td>Winter</td>
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<td><strong>Total</strong></td>
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<thead>
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<th>Course</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>BIO 233: Human Anatomy and Physiology III</td>
<td>Spring</td>
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<tr>
<td>EMS 115: Introduction to EMS</td>
<td>Spring</td>
<td>3</td>
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<tr>
<td>PSY 201: Psychology</td>
<td>Spring</td>
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<td>WRI 122: Argumentative Writing</td>
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<td><strong>Total</strong></td>
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### Sophomore Year

#### Paramedic Professional Courses (Additional Application Required)

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CHE 210: Clinical Pharmacology</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>EMS 218: Trauma Emergencies</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>EMS 231: Medical Emergencies I</td>
<td>Fall</td>
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</tr>
<tr>
<td>EMS 235: Basic EKG</td>
<td>Fall</td>
<td>3</td>
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<tr>
<td>EMS 241: Paramedic C.R.M. I</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>EMS 271: Paramedic Skills Laboratory I</td>
<td>Fall</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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<tr>
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<tbody>
<tr>
<td>EMS 211: Prehospital Pharm.</td>
<td>Winter</td>
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<tr>
<td>EMS 232: Medical Emergencies II</td>
<td>Winter</td>
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</tr>
<tr>
<td>EMS 236: Advanced Electrocardiography</td>
<td>Winter</td>
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<td>EMS 242: Paramedic C.R.M. II</td>
<td>Winter</td>
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<td>EMS 272: Paramedic Skills Laboratory II</td>
<td>Winter</td>
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<tr>
<td>EMS 283: *Group 1: Clinical Practicum I (or)</td>
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<tr>
<td>EMS 284: *Group 2: Clinical Practicum II</td>
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<td><strong>Total</strong></td>
<td><strong>Winter</strong></td>
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<tbody>
<tr>
<td>EMS 233: Medical Emergencies III</td>
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</tr>
<tr>
<td>EMS 273: Paramedic Skills Laboratory III</td>
<td>Spring</td>
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<tr>
<td>EMS 243: Paramedic C.R.M. III</td>
<td>Spring</td>
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<tr>
<td>EMS 283: *Group 2: Clinical Practicum I (or)</td>
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<tr>
<td>EMS 284: *Group 1: Clinical Practicum II</td>
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</tr>
<tr>
<td>EMS 291: Field Externship I</td>
<td>Spring</td>
<td>4</td>
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<tbody>
<tr>
<td>EMS 292: Field Externship</td>
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### Junior Year

#### Fall

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<tr>
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<tbody>
<tr>
<td>BUS 317: Health Care Management</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>BUS 337: Principles of Health Care Marketing</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>EMS 321: Community Paramedic I</td>
<td>Fall</td>
<td>4</td>
</tr>
<tr>
<td>EMS 341: Community Paramedic Clinical I</td>
<td>Fall</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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#### Winter

<table>
<thead>
<tr>
<th>Course</th>
<th>Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BUS 313: Health Care Systems and Policy</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>ECO 202: Principles of Economics, Macro</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>EMS 322: Community Paramedic II</td>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>EMS 342: Community Paramedic Clinical II</td>
<td>Winter</td>
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<tr>
<td><strong>Total</strong></td>
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### Senior Year

#### Fall

<table>
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<tr>
<th>Course</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>EMS 332: Critical Care Transport II</td>
<td>Fall</td>
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<tr>
<td>EMS 382: Critical Care Practicum II</td>
<td>Fall</td>
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</tr>
<tr>
<td>HUM 300 or 400 Elective</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>PSY 347: Organizational Behavior</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>SPE 321: Small Group &amp; Team Communication</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Fall</strong></td>
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#### Winter

<table>
<thead>
<tr>
<th>Course</th>
<th>Term</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BUS 349: Human Resource Management</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>MATH 361: Statistical Methods I</td>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>PHIL 331: Ethics in the Professions</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>WRI 327: Advanced Technical Writing</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Winter</strong></td>
<td><strong>13</strong></td>
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</tbody>
</table>

### Total Credits Required for B.S. in Emergency Medical Services Management Community Care Track: 191
Civil Engineering

Sean St. Clair, Department Chair  
Roger Lindgren, Program Director, Master of Science in Civil Engineering  
David Thaemert, Curriculum Coordinator  
Professors: R. Lindgren, S. St. Clair  
Associate Professors: C. Riley, D. Thaemert  
Assistant Professors: M. Sleep

Civil engineers design infrastructure—transportation networks, bridges, buildings, dams, communities, and water and waste management systems—for the enhancement of human welfare and protection of our environment. Oregon Tech’s freshman-to-master’s Civil Engineering degree program, the first such program in the Pacific Northwest, equips students to meet industry needs identified by the American Society of Civil Engineers (ASCE). This unique pairing of degrees prepares future professionals for licensing requirements proposed in the ASCE Policy Statement 465.

Career Opportunities

Upon completing the core curriculum, civil engineering students have a solid foundation in structural, transportation, water resources/environmental, and geotechnical engineering. In their fourth and fifth years of study, students can then target specific careers within the broad field of civil engineering. Graduates have career opportunities with consulting firms, government agencies, heavy construction and industry.

Geotechnical engineering involves the design and construction of projects built on and of the earth. These projects include foundations for structures, earth embankments of soil and rock, dams, levees, and tunnels. In addition, geotechnical engineers predict reactions of the earth due to changes imposed by other engineered systems.

Structural engineering involves the planning, analysis and design of buildings and other structures using the principal construction materials of wood, steel, concrete and masonry. Graduates are familiar with current codes and standards, and are aware of trends in high-performance structures.

Transportation engineering is concerned with the planning, design, construction, operation, performance, evaluation and rehabilitation of transportation systems and facilities, such as streets, highways, railroads, mass transit, and air transportation systems.

Water resources and environmental engineering address the spectrum of water from supply to transport to use to discharge, and are at the junction of efforts to provide sustainable human and natural environments, in compliance with regulatory mandates. Graduates have opportunities in planning, design, and operation of hydraulic and water resource projects, floodplain management, or resource management issues.

Civil engineering graduates may consider a concurrent degree in environmental sciences to expand career opportunities with a broad spectrum of government agencies, consulting firms, and industry.

**Degrees Offered**

Bachelor of Science & Master of Science in Civil Engineering (co-terminal degrees)  
Master of Science in Civil Engineering  
Bachelor of Science in Civil Engineering

**Mission Statement**

The mission of the Oregon Tech Civil Engineering Program is to prepare students for professional practice. To be prepared to practice as professionals, engineers must be able to act responsibly and ethically, understand their limits and the limits of the tools they use, communicate effectively, work well in teams, and, amid the changing landscape of the field of civil engineering, be able to pursue graduate-level education.

**Objectives**

Civil engineering graduates will be able to:
1. Practice as a professional civil engineer.  
2. Pursue advanced education in civil engineering or related fields.  
3. Act as responsible, effective and ethical citizens.  
4. Understand and effectively communicate the realistic constraints of civil engineering.  

Students enjoy a close relationship with full-time faculty with advanced engineering degrees who are also licensed professionals with many years of practical experience. Course offerings promote education in theory relevant to our civil engineering technical areas, engineering design and principles of sustainable development. These concepts are emphasized and integrated throughout the curriculum in a sequential manner.

Early in the curriculum, elements of the creative design process are introduced as students complete first-year design projects. While most freshman and sophomore courses are intended to provide a solid background in mathematics, communications, basic sciences, and engineering mechanics, certain courses provide additional concepts and methodologies supporting more advanced topics in engineering and professional practice.

At the junior level, students develop a broad civil engineering base. Junior courses include core topics in structural, transportation, water resources and geotechnical engineering.

In the fourth year, students are required to complete an intensive engineering design project. This effort is focused on a professional-quality civil engineering design and includes essential elements of technical communications and group dynamics. The design project also involves realistic constraints including cost and sustainability considerations, socioeconomic concerns, aesthetic choices and ethical deliberations. Fourth-year students prepare for the Fundamentals of Engineering (FE) examination as a first step toward licensure as professional engineers. In this year, co-terminal (BS/MS) degree-seeking students also begin their selected program of graduate-level coursework leading to selection of their graduate project.

Finally, in the fifth year, co-terminal students complete coursework and individual graduate projects leading to the co-terminal bachelor’s and master’s degrees.

To ensure graduates can become responsible, effective citizens and begin building a foundation for lifelong learning, students are required to satisfy Oregon Tech general education requirements in communication, humanities, social sciences, and science/mathematics.

**Student Preparation**

Students interested in the field of civil engineering should emphasize mathematics and
Bachelor of Science in Civil Engineering
Curriculum

Required courses and recommended terms during which they should be taken:

**Freshman Year**
- Fall
  - CHE 221 General Chemistry I 5
  - ENGR 101 Introduction to Engineering I 2
  - SPE 111 Public Speaking 3
  - WRI 121 English Composition 3
  - Humanities Elective 3
  - Social Science Elective 3
  - Total 16
- Winter
  - CHE 222 General Chemistry II 5
  - ENGR 102 Introduction to Engineering II 2
  - WRI 122 Argumentative Writing 3
  - Humanities Elective 3
  - Total 16

**Sophomore Year**
- Fall
  - CE 212 Civil Engineering Materials 4
  - GME 161 Computer-aided Drafting 4
  - MATH 251 Differential Calculus 4
  - Humanities Elective 3
  - Social Science Elective 3
  - Total 14
- Winter
  - CE 205 Engineering Graphics 5
  - GEOL 201 Physical Geology 4
  - MATH 252 Integral Calculus 4
  - General Physics with Calculus 4
  - Total 14

**Junior Year**
- Fall
  - CHE 311 Intro to Geotechnical Engineering 5
  - CE 331 Structural Analysis 4
  - ENGR 318 Engineering Mechanics: Fluids 4
  - MATH 361 Statistical Methods I 4
  - Total 17
- Winter
  - ANTH/HIST 335 Social Science Elective 3
  - CE 341 Engineering Graphics 5
  - CE 351 Intro to Transportation Engineering 4
  - CE 371 Closed Conduit System 4
  - Total 16

**Senior Year**
- Fall
  - CE 401 Civil Engineering Project I 5
  - CE 405 Sustainability & Infrastructure 3
  - CE 442/444 (Intermediate Structures Course) 4
  - CE 4XX Civil Engineering Elective 3
  - Total 15
- Winter
  - CE 402 Civil Engineering Project II 7
  - CE 4XX Civil Engineering Elective 3
  - CE 4XX Civil Engineering Elective 3
  - Total 13
- Spring
  - ANTH 452 Globalization (SS) 3
  - CE 4XX Civil Engineering Elective 3
  - CE 4XX Civil Engineering Elective 3
  - Social Science Elective 3
  - Total 15

* Humanities courses may not be skill or performance based. One Humanities course must study literature (typically LIT prefix).
Civil electives must total at least 15 credits (of which at least 9 credits must be CE 400 or 500 level electives).

**Total Credits Required for B.S. in Civil Engineering:** 180
**Concurrent Degree in Environmental Sciences**

Civil Engineering students have the opportunity to earn concurrent degrees in Civil Engineering and Environmental Sciences. The additional degree requires 45 credits in Environmental Sciences courses, which can be taken concurrent to Civil Engineering courses or as an add-on year. The dual degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Civil Engineering graduates.

The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Civil Engineering.

Total Additional Credits Needed: 53

**Bachelor of Science/Master of Science in Civil Engineering Curriculum**

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Year</td>
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<tr>
<td>CHE 221</td>
<td>General Chemistry I</td>
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<td>ENGR 101</td>
<td>Introduction to Engineering I</td>
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<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
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<td>WRI 121</td>
<td>English Composition</td>
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<td>Humanities Elective†</td>
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**Freshman Year**

<table>
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<tbody>
<tr>
<td>CHE 222</td>
<td>General Chemistry II</td>
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<td>ENGR 102</td>
<td>Introduction to Engineering II</td>
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<td>Argumentative Writing</td>
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**Sophomore Year**

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<th>Winter</th>
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<tbody>
<tr>
<td>CE 203</td>
<td>Engineering Graphics</td>
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<td>GEO 201</td>
<td>Physical Geography</td>
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<td>MATH 251</td>
<td>Differential Calculus</td>
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<td>Humanities Elective†</td>
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**Sophomore Year**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>CE 212</td>
<td>Civil Engineering Materials</td>
</tr>
<tr>
<td>GME 161</td>
<td>Plane Surveying I</td>
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<tr>
<td>MATH 252</td>
<td>Integral Calculus</td>
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<tr>
<td>PHY 221</td>
<td>General Physics with Calculus</td>
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**Sophomore Year**

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<tr>
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<tbody>
<tr>
<td>CE 205</td>
<td>Computational Methods</td>
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<tr>
<td>ENGR 211</td>
<td>Engineering Mechanics: Statics</td>
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<tr>
<td>MATH 254N</td>
<td>Vector Calculus I</td>
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<td>PHY 222</td>
<td>General Physics with Calculus</td>
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**Sophomore Year**

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<thead>
<tr>
<th>Spring</th>
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<tbody>
<tr>
<td>CE 208</td>
<td>Principles of Professional Practice</td>
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<tr>
<td>ENGR 213</td>
<td>Engineering Mechanics: Strength of Materials</td>
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<td>GIS 134</td>
<td>Geographic Information systems</td>
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<td>WRI 227</td>
<td>Technical Report Writing</td>
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**Junior Year**

<table>
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<tr>
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<tbody>
<tr>
<td>CE 311</td>
</tr>
<tr>
<td>CE 331</td>
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<tr>
<td>ENGR 318</td>
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<td>MATH 361</td>
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**Junior Year**

<table>
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<tr>
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<tbody>
<tr>
<td>ANTH/HIST 335</td>
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<tr>
<td>CE 341</td>
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<td>CE 351</td>
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**Junior Year**

<table>
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<td>CE 312</td>
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<td>MATH 321</td>
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**Fourth Year**

<table>
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<tbody>
<tr>
<td>CE 401</td>
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<tr>
<td>CE 405</td>
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<td>CE 442</td>
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<td>Technical Electives&quot;</td>
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<tr>
<td>CE 501</td>
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<tr>
<td>MATH 4XX</td>
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<tr>
<td>WRI 521</td>
</tr>
<tr>
<td>Year Total</td>
</tr>
</tbody>
</table>

**Fifth Year**

<table>
<thead>
<tr>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 452</td>
</tr>
<tr>
<td>CE 590</td>
</tr>
<tr>
<td>Technical Electives&quot;</td>
</tr>
<tr>
<td>Technical Electives &gt;500&quot;</td>
</tr>
<tr>
<td>Social Science Elective</td>
</tr>
<tr>
<td>Year Total</td>
</tr>
</tbody>
</table>

Total Credits Required for BS/MSCE: 225

* Humanities courses may not be skill or performance based. One Humanities course must study literature (typically LIT prefix).

** Technical Electives are generally 400- and 500-level CE courses. A maximum of 9 non-CE technical elective credits (specified below) may be applied to the co-terminal BSCE/MSCE degree.
### Allowed Non-CE Technical Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV 435</td>
<td>Atmospheric Physics</td>
<td>4</td>
</tr>
<tr>
<td>GME 351</td>
<td>Construction and Engineering Surveying</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>GME 372</td>
<td>Subdivision Planning and Platting</td>
<td></td>
</tr>
<tr>
<td>GME 425</td>
<td>Remote Sensing</td>
<td></td>
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<tr>
<td>MATH 341</td>
<td>Linear Algebra</td>
<td>4</td>
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<tr>
<td>MATH 425</td>
<td>Vector Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 451</td>
<td>Numerical Methods I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 465</td>
<td>Mathematical Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>
Communication Department

Matt Schnackenberg, Department Chair
Professors: K. Brown, M. Dyrud, L. Young
Associate Professors: D. Peterson, M. Schnackenberg
Assistant Professors: A. Fultz, V. Koehn, R. Schwartz, M. Search, C. Syrnyk, C. Vukasovich

Degree Offered
Bachelor of Science in Communication Studies

The Bachelor of Science in Communication Studies allow students flexibility in designing a program that fits their life and career goals. Students choose core courses and Electives from areas such as technical, organizational, and interpersonal communication. In addition, students build a career foundation by completing a focused sequence of Electives.

Minors Offered
Human Communication
Technical Communication

Certificate Offered
Dispute Resolution

Career Opportunities
The Communication Studies Program prepares students for careers in areas such as technical communication, organizational communication, new communication technologies, education, human resources, project management, public relations, sales, and mediation.

General Education Courses
To ensure that Oregon Tech's graduates are skilled communicators, the Communication Department provides writing, speech, and communication courses to satisfy general education requirements. Students in other majors should consult the general education and degree requirements in their major departments.

Student Preparation
All students who plan to study at Oregon Tech should enroll in writing and speech classes during their high school years to better benefit from the university’s communication courses. Students applying to the Communication Studies Program should have especially strong reading and writing skills. It is important to have a well-rounded college preparation background, including courses in math, sciences, and general education.

Degree Requirements
The Bachelor of Science in Communication Studies requires 184 credits. All major courses, general education communication courses, and focused sequence of electives courses must be completed with a grade of “C” or higher.

Bachelor of Science in Communication Studies
Curriculum
Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 104</td>
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<tr>
<td>COM 225</td>
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</tr>
<tr>
<td>MIS 101</td>
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<tr>
<td>PSY 201</td>
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</tr>
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<td>WRI 121</td>
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<tr>
<td>Laboratory Science Elective</td>
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<table>
<thead>
<tr>
<th>Freshman Year</th>
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</tr>
</thead>
<tbody>
<tr>
<td>COM 105</td>
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<tr>
<td>COM 115</td>
<td>3</td>
</tr>
<tr>
<td>MIS 102</td>
<td>1</td>
</tr>
<tr>
<td>PSY 202</td>
<td>3</td>
</tr>
<tr>
<td>SPE 111</td>
<td>3</td>
</tr>
<tr>
<td>WRI 122</td>
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<table>
<thead>
<tr>
<th>Freshman Year</th>
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<tbody>
<tr>
<td>ART 207</td>
<td>3</td>
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<tr>
<td>COM 106</td>
<td>3</td>
</tr>
<tr>
<td>COM 205</td>
<td>3</td>
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<td>COM 109</td>
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<tr>
<td>MIS 103</td>
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<tr>
<td>PSY 203</td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
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</thead>
<tbody>
<tr>
<td>COM 216</td>
<td>3</td>
</tr>
<tr>
<td>MATH 100 pre-req</td>
<td>4</td>
</tr>
<tr>
<td>SPE 321</td>
<td>3</td>
</tr>
<tr>
<td>WRI 227</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
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</tr>
</thead>
<tbody>
<tr>
<td>COM 237</td>
<td>3</td>
</tr>
<tr>
<td>COM 276</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 211</td>
<td>3</td>
</tr>
<tr>
<td>Focused Sequence Elective (outside 1)**</td>
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<tr>
<td>Social Science Elective</td>
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</table>
### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COM 248</td>
<td>Digital Media Production</td>
<td>3</td>
</tr>
<tr>
<td>COM 255</td>
<td>Communication Ethics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Business Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Focused Sequence Elective*</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Laboratory Science/Math Elective</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
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### Junior Year - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 301</td>
<td>Rhetorical Theory and Applications</td>
<td>3</td>
</tr>
<tr>
<td>COM 325</td>
<td>Gender and Communication</td>
<td>3</td>
</tr>
<tr>
<td>COM 326</td>
<td>Communication Research</td>
<td>3</td>
</tr>
<tr>
<td>Focused Sequence Elective (outside 2)**</td>
<td>3</td>
<td></td>
</tr>
<tr>
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<tr>
<td><strong>Total</strong></td>
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### Junior Year - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 345</td>
<td>Organizational Communication I</td>
<td>3</td>
</tr>
<tr>
<td>SPE 314</td>
<td>Argumentation</td>
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<tr>
<td></td>
<td>Social Science Elective (UD)</td>
<td>3</td>
</tr>
<tr>
<td>Focused Sequence Elective in major (UD)(2)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Focused Sequence Elective (outside 3)**</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
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</tbody>
</table>

### Junior Year - Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 347</td>
<td>Negotiation and Conflict</td>
<td>3</td>
</tr>
<tr>
<td>COM 358</td>
<td>Communication and the Law</td>
<td>3</td>
</tr>
<tr>
<td>Focused Sequence Elective (outside 4)**</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Humanities Elective (UD)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Writing (UD)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>

### Senior Year - Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 309</td>
<td>Applied Technology</td>
<td>3</td>
</tr>
<tr>
<td>COM 420</td>
<td>Extern/Senior Project</td>
<td>4</td>
</tr>
<tr>
<td>Humanities Elective (UD)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

### Senior Year - Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 420</td>
<td>Extern/Senior Project</td>
<td>4</td>
</tr>
<tr>
<td>Focused Sequence Elective in major (UD)(3)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Science Elective (UD)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Science Elective</td>
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<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

### Human Communication Minor

The Human Communication Minor supplements Oregon Tech technical and applied science degrees and provides advanced training in communication skills. The minor offers courses in the analysis and practice of human communication in a variety of areas including interpersonal, intercultural, health, nonverbal and electronic communication.

In addition, the minor allows students to practice conflict resolution, negotiation strategies, ethical communication and rhetorical analysis. Students who have performed well in general education communication courses are encouraged to enroll in this minor. For further information on enrollment, contact a member of the Communication Department or the Communication Department chair.

One goal of the Human Communication Minor is to educate students from a variety of majors in the effective practice of human communication skills based on theoretical understandings of communication.

### Career Opportunities

The Human Communication minor enhances students’ employability and career flexibility. Many employers in many industries seek employees who can work effectively on multi-disciplinary teams, communicate in many (including international) contexts, understand and resolve conflict in the workplace and analyze and create effective messages in a variety of settings.

### Requirements of the Human Communication Minor

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 205</td>
<td>Intercultural Communication</td>
<td></td>
</tr>
<tr>
<td>COM 225</td>
<td>Interpersonal Communication</td>
<td></td>
</tr>
<tr>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
<td></td>
</tr>
</tbody>
</table>

In addition, students will select THREE from the following list of courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 226</td>
<td>Nonverbal Communication</td>
<td></td>
</tr>
<tr>
<td>COM 301</td>
<td>Rhetorical Theory and Application</td>
<td></td>
</tr>
<tr>
<td>COM 320</td>
<td>Advanced Intercultural Communication</td>
<td></td>
</tr>
<tr>
<td>COM 346</td>
<td>Health Communication</td>
<td></td>
</tr>
<tr>
<td>COM 347</td>
<td>Negotiation and Conflict Resolution</td>
<td></td>
</tr>
<tr>
<td>COM 365</td>
<td>Electronic Communication and Society</td>
<td></td>
</tr>
<tr>
<td>PHIL 331</td>
<td>Ethics in the Professions</td>
<td></td>
</tr>
</tbody>
</table>

**Curriculum notes:** To earn the Bachelor of Science degree, students must complete 36 credits in mathematics and science or 45 credits in mathematics, science, and social science. Students must also complete 60 credits of upper-division courses.

There is no guarantee of externships for Communication Studies majors. The best externship experiences are often those identified and arranged by students.

**Total Required Credits for in B.S. Communication Studies: 184**
Technical Communication Minor
The Technical Communication Minor supplements Oregon Tech technical degrees and provides advanced training and experience in communication skills. The minor offers specialized communication courses in such varied areas as proposal and grant writing, documentation development, and technical editing.

Students who have performed above-average work in their lower-division communication courses are encouraged to enroll in the program. For further information on enrollment, contact any Communication Department faculty member.

Career Opportunities
The Technical Communication Minor will enhance students’ flexibility as their careers develop. Employers in private industry, governmental agencies, and research facilities seek a unique combination of skills. First, employers know that the major coursework at Oregon Tech prepares students well. Second, the Technical Communication Minor courses build skills in project development, manual writing and editing, computer-aided writing and publishing, oral presentations, and interviewing skills that complement technical education. Even if students choose not to work as technical writers or editors, the Technical Communication Minor may increase job opportunities and professional advancement.

Requirements of the Minor
In addition to the general education requirements in communication, Technical Communication Minor students take four upper-division courses (12 units). Students take two required core courses and choose two Electives from the list below. Students must earn a “C” or better in all courses to complete the minor.

Required Courses
COM 301 Rhetorical Theory and Application
WRI 328 Technical Journalism

Elective Courses
COM 365 Electronic Communication and Society
COM 415 Developing Effective Multimedia-based Presentations
WRI 350 Documentation Development
WRI 410 Proposal and Grant Writing
WRI 415 Technical Editing
WRI 420 Document Design

Dispute Resolution Certificate
The Dispute Resolution Certificate provides students with a thorough foundation of communication courses related to dispute resolution. The program culminates in specialized courses: negotiation, facilitation, and mediation, giving students expertise in the field. A practicum in mediation offers practical experience in community mediation and guarantees competence of students completing the certificate. This certificate provides students with both the theoretical background and the practical experience to effectively resolve conflicts in a variety of contexts.

Prerequisite or Co-requisite Classes
SPE 111 Public Speaking 3
WRI 121 English Composition 3
WRI 122 Argumentative Writing 3

Program Courses
COM 205 Intercultural Communication 3
COM 225 Interpersonal Communication 3
COM 226 Nonverbal Communication 3
COM 345 Organizational Communication I 3
COM 347 Negotiation and Conflict Resolution 3
COM 348 Facilitation 3
COM 425 Mediation 3
COM 426 Mediation Practicum 3
SPE 321 Small Group and Team Communication 3
## Computer Systems Engineering Technology Department

Calvin Caldwell, Department Chair  
Jay Bockelman, Wilsonville Operations Program Director, Software Engineering Technology and Embedded Systems Engineering Technology  
Todd Breedlove, Program Director, Software Engineering Technology  
Doug Lynn, Program Director, Computer Engineering Technology  
Jim Long, Program Director, Embedded Systems Engineering Technology  
Sherry Yang, Curriculum Coordinator, Software Engineering Technology  
Phong Nguyen, Curriculum Coordinator, Computer Engineering Technology  
Professors: J. Bockelman, T. Breedlove, C. Caldwell, C. Kansaku, J. Long, D. Lynn, S. Yang  
Associate Professors: P. Nguyen  
Assistant Professors: D. Bishop, P. Howard, K. Pintong, T. Scevers

### Degrees Offered

- Bachelor of Science in Computer Engineering Technology  
- Bachelor of Science in Software Engineering Technology  
- Bachelor of Science in Embedded Systems Engineering Technology  
- Associate of Engineering in Computer Engineering Technology  
- Associate of Engineering in Software Engineering Technology

### Common First-Year Curriculum

The Bachelor of Science in Computer Engineering Technology, Bachelor of Science in Software Engineering Technology, Bachelor of Science in Embedded Systems Engineering Technology, the Associate of Engineering in Computer Engineering Technology and the Associate of Engineering in Software Engineering Technology all share a common first-year curriculum.

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Freshman Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CST 116</td>
<td>C++ Programming I</td>
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</tr>
<tr>
<td></td>
<td>CST 162</td>
<td>Digital Logic I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 111</td>
<td>College Algebra</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>WRI 121</td>
<td>English Composition</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>15</td>
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</table>

#### Freshman Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>CST 126</td>
<td>C++ Programming II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CST 130</td>
<td>Computer Organization</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 112</td>
<td>Trigonometry</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>SPE 111</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>WRI 122</td>
<td>Argumentative Writing</td>
<td>3</td>
</tr>
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<td></td>
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</table>

#### Freshman Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>CST 129</td>
<td>Embedded C</td>
<td>4</td>
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<tr>
<td></td>
<td>CST 131</td>
<td>Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CST 136</td>
<td>Object-Oriented Programming with C++</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 251</td>
<td>Differential Calculus</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

### Computer Engineering Technology

#### Degrees Offered

- Bachelor of Science in Computer Engineering Technology  
- Associate of Engineering in Computer Engineering Technology

#### Bachelor of Science and Associate of Engineering Degrees

All students who complete the curriculum requirements in Computer Engineering Technology will be knowledgeable in the theory and applications of both computer hardware and software.

#### Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

#### Career Opportunities

Work in the field of computer engineering technology includes: application specific integrated circuit development, firmware development, embedded systems design, software development, testing and applications of technology.

Computer engineering technology graduates will be involved in development of hardware, software and embedded applications that adapt digital logic and computer systems to solve problems in a wide range of industries from industrial manufacturing to consumer electronics. In addition, they may be involved in product testing and qualification or in application engineering, customer support, sales and public relations.

The associate's degree curriculum gives the student a strong foundation in both hardware and software aspects of computing, while also furnishing a solid background in general education subjects including mathematics, physics and communication. The associate degree graduate qualifies as a technician who is productive immediately upon entering the work force. The associate's degree also provides a way for students who obtain degrees in related disciplines to add breadth to their education.

The bachelor's curriculum goes beyond the associate's degree curriculum providing the greater depth and breadth of technical capability necessary for an engineering technologist. The graduate is qualified to assume a responsible position in business or
industry. Graduates may be responsible for the development, use and the maintenance of computing systems, and for the supervision of personnel.

New careers are constantly evolving in both the hardware and software branches of this field. A diversified study allows the graduate to quickly adapt to changing market conditions.

**Curriculum Mission and Objectives**

The mission of the Computer Engineering Technology (CET) Degree program in the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to provide an excellent education incorporating industry-relevant, applied laboratory-based design and analysis to our students. The program is to serve a constituency consisting of its Alumni, employers in the high-technology industry and the members of our IAB. Major components of the CET program’s mission in the CSET Department are to:

- educate computer engineering technology students to meet current and future industrial challenges;
- promote a sense of scholarship, leadership and professional service among our graduates;
- enable students to create, develop, and disseminate knowledge for the applied engineering environment;
- expose students to a cross-disciplinary educational program;
- provide high tech industry employers with graduates in the computer engineering technology profession, a profession which is increasingly being driven by advances in technology.

**CET Bachelor of Science Program Educational Objectives**

Alumni of the Computer Engineering Technology (CET) Bachelor Degree program may be employed in a wide range of high tech industries from industrial manufacturing to consumer electronics. Alumni may be involved in product testing and qualification, customer support, sales, or public relations.

1. Alumni will demonstrate technical competence through success in computer engineering technology positions and/or pursuit of engineering or engineering technology graduate studies if desired.
2. Alumni will demonstrate competencies in communication and teamwork skills by assuming increasing levels of responsibility and/or leadership or managerial roles.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

**CET Associate Degree Program Education Objectives**

Alumni of the Computer Engineering Technology (CET) Associate Degree program may be employed as technicians or in support roles in a wide range of high tech industries from industrial manufacturing to consumer electronics. Alumni may be involved in product testing and qualification, customer support, sales, or public relations.

1. Alumni will demonstrate technical competence through success in computer engineering technician positions.
2. Alumni will demonstrate competencies in communication and teamwork skills through positive contributions to team based engineering projects.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

According to current statistics, one third of students who obtain the CET Associate degree also obtain a bachelor degree in a related discipline, most often a bachelor degree in Software. In this case, the Associate degree adds breadth to their education. Alumni in this category would be expected to perform at a level consistent with the bachelor degree program educational objectives.

**Accreditation**

The Computer Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission (ETAC), Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

**Degree Requirements**

Associate of engineering technology degree students must complete 94 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Computer Engineering Technology degree requires 94 additional credit hours, for a total of 188 credits, as prescribed by the curriculum outline.

**Cooperative Field Experience**

The cooperative program includes work experience during the junior and senior years. The co-op period is an employment arrangement with an employer in the area of the student’s major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

A student must have junior standing in Computer Engineering Technology to be considered for this program.
Bachelor of Science in Computer Engineering Technology
Curriculum

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Year</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>CST 116 C++ Programming I                                             4</td>
</tr>
<tr>
<td></td>
<td>CST 162 Digital Logic I                                               4</td>
</tr>
<tr>
<td></td>
<td>MATH 111 College Algebra                                              4</td>
</tr>
<tr>
<td></td>
<td>WRI 121 English Composition                                           3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  15</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 126 C++ Programming II                                            4</td>
</tr>
<tr>
<td></td>
<td>CST 130 Computer Organization                                         3</td>
</tr>
<tr>
<td></td>
<td>MATH 112 Trigonometry                                                 4</td>
</tr>
<tr>
<td></td>
<td>SPE 111 Public Speaking                                               3</td>
</tr>
<tr>
<td></td>
<td>WRI 122 Argumentative Writing                                         3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  17</td>
</tr>
<tr>
<td>Sophomore Year</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>CST 120 Embedded C                                                    4</td>
</tr>
<tr>
<td></td>
<td>CST 151 Computer Architecture                                         3</td>
</tr>
<tr>
<td></td>
<td>CST 136 Object-Oriented Programming with C++                          4</td>
</tr>
<tr>
<td></td>
<td>MATH 251 Differential Calculus                                        4</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  15</td>
</tr>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 133 Digital Logic II                                              4</td>
</tr>
<tr>
<td></td>
<td>CST 134 Instrumentation                                               1</td>
</tr>
<tr>
<td></td>
<td>CST 250 Computer Assembly Language                                     4</td>
</tr>
<tr>
<td></td>
<td>MATH 252 Integral Calculus                                            4</td>
</tr>
<tr>
<td></td>
<td>WRI 227 Technical Report Writing                                      3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 204 Introduction to Microcontrollers                              4</td>
</tr>
<tr>
<td></td>
<td>CST 231 Digital Systems Design I                                      4</td>
</tr>
<tr>
<td></td>
<td>EE 221 Circuits I                                                     4</td>
</tr>
<tr>
<td></td>
<td>MATH 254N Vector Calculus                                             4</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
<tr>
<td>Sophomore Year</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>CST 240 UNIX                                                          4</td>
</tr>
<tr>
<td></td>
<td>EET 237 AC Circuits, Filters and Signals                              3</td>
</tr>
<tr>
<td></td>
<td>EET 238 AC Circuits, Filters and Signals Laboratory                   3</td>
</tr>
<tr>
<td></td>
<td>SPE 321 Small Group and Team Communication                           3</td>
</tr>
<tr>
<td></td>
<td>Advanced Math Elective**                                             4</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  15</td>
</tr>
<tr>
<td>Junior Year</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>CST 357 Embedded System Architecture                                   5</td>
</tr>
<tr>
<td></td>
<td>CST 315 Embedded Sensor Interfacing                                   4</td>
</tr>
<tr>
<td></td>
<td>CST 371 Embedded Systems Development I                                4</td>
</tr>
<tr>
<td></td>
<td>PHY 221 General Physics with Calculus                                 4</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  17</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 331 Microprocessor Peripheral Interfacing                          5</td>
</tr>
<tr>
<td></td>
<td>CST 372 Embedded Systems Development II                              3</td>
</tr>
<tr>
<td></td>
<td>PHY 222 General Physics with Calculus                                 4</td>
</tr>
<tr>
<td></td>
<td>Social Science Elective                                              3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  15</td>
</tr>
<tr>
<td>Senior Year</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>BUS 304 Engineering Management                                       3</td>
</tr>
<tr>
<td></td>
<td>CST 344 Intermediate Computer Architecture                            3</td>
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<tr>
<td></td>
<td>CST 441 Logic Synthesis with VHDL+                                    3</td>
</tr>
<tr>
<td></td>
<td>PHIL 331 Ethics in the Professions                                    3</td>
</tr>
<tr>
<td></td>
<td>Technical Elective*                                                  3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  15</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 418 Data Communications and Networks                              3</td>
</tr>
<tr>
<td></td>
<td>CST 442 Advanced Computer Architecture                                3</td>
</tr>
<tr>
<td></td>
<td>CST 451 ASIC Design using FPGAs+                                     4</td>
</tr>
<tr>
<td></td>
<td>MGT 345 Engineering Economy                                          3</td>
</tr>
<tr>
<td></td>
<td>Social Science Elective                                              3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
<tr>
<td>Senior Year</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>ANTH 452 Globalization                                                3</td>
</tr>
<tr>
<td></td>
<td>CST 461 Advanced Topics in VLSI Design+                               3</td>
</tr>
<tr>
<td></td>
<td>CST 464 RISC-Based Microprocessor Systems                             4</td>
</tr>
<tr>
<td></td>
<td>Humanities Elective                                                  3</td>
</tr>
<tr>
<td></td>
<td>Social Science Elective                                              3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
</tbody>
</table>

Total Credits Required for B.S. in Computer Engineering Technology: 188

Associate of Engineering in Computer Engineering Technology
Curriculum

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Year</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>CST 116 C++ Programming I                                             4</td>
</tr>
<tr>
<td></td>
<td>CST 162 Digital Logic I                                               4</td>
</tr>
<tr>
<td></td>
<td>MATH 111 College Algebra                                              4</td>
</tr>
<tr>
<td></td>
<td>WRI 121 English Composition                                           5</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  15</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 126 C++ Programming II                                            4</td>
</tr>
<tr>
<td></td>
<td>CST 130 Computer Organization                                         3</td>
</tr>
<tr>
<td></td>
<td>MATH 112 Trigonometry                                                 4</td>
</tr>
<tr>
<td></td>
<td>SPE 111 Public Speaking                                               3</td>
</tr>
<tr>
<td></td>
<td>WRI 122 Argumentative Writing                                         3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  17</td>
</tr>
<tr>
<td>Sophomore Year</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>CST 133 Digital Logic II                                              4</td>
</tr>
<tr>
<td></td>
<td>CST 134 Instrumentation                                               1</td>
</tr>
<tr>
<td></td>
<td>CST 250 Computer Assembly Language                                     4</td>
</tr>
<tr>
<td></td>
<td>MATH 252 Integral Calculus                                            4</td>
</tr>
<tr>
<td></td>
<td>WRI 227 Technical Report Writing                                      3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CST 204 Introduction to Microcontrollers                              4</td>
</tr>
<tr>
<td></td>
<td>CST 231 Digital Systems Design I                                      4</td>
</tr>
<tr>
<td></td>
<td>EE 221 Circuits I                                                     4</td>
</tr>
<tr>
<td></td>
<td>PHY 221 General Physics with Calculus                                 4</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
<tr>
<td>Sophomore Year</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>CST 240 UNIX                                                          4</td>
</tr>
<tr>
<td></td>
<td>EET 237 AC Circuits, Filters and Signals                              3</td>
</tr>
<tr>
<td></td>
<td>EET 238 AC Circuits, Filters and Signals Laboratory                   3</td>
</tr>
<tr>
<td></td>
<td>PHY 222 General Physics with Calculus                                 4</td>
</tr>
<tr>
<td></td>
<td>Humanities or Social Science Elective                                3</td>
</tr>
<tr>
<td></td>
<td>Total                                                                  16</td>
</tr>
</tbody>
</table>

Total Credits Required for Associate of Engineering in Computer Engineering Technology: 94
**Concurrency Degree**
The CSET Department provides the opportunity for the interested student to earn a bachelor's degree in computer engineering technology and software engineering technology concurrently. Such concurrent degree holders are highly sought after in industry since they know and understand both the hardware and software aspects of computers. The purpose of the concurrent CSET/SET Degree Program is to challenge the brightest and most motivated students to become even better prepared for the job market, extending their time in college by an additional year. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science degree in Computer Engineering Technology with the exception of WRI 327, the CST elective and the MATH elective.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CST 136</td>
<td>Object-Oriented Programming with C++</td>
<td>4</td>
</tr>
<tr>
<td>CST 211</td>
<td>Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CST 229</td>
<td>Introduction to Grammars</td>
<td>4</td>
</tr>
<tr>
<td>CST 236</td>
<td>Software Systems Testing</td>
<td>4</td>
</tr>
<tr>
<td>CST 238</td>
<td>Graphical User Interface Programming</td>
<td>4</td>
</tr>
<tr>
<td>CST 276</td>
<td>Software Design Patterns</td>
<td>4</td>
</tr>
<tr>
<td>CST 320</td>
<td>Compiler Methods</td>
<td>4</td>
</tr>
<tr>
<td>CST 324</td>
<td>Database Systems and Design</td>
<td>4</td>
</tr>
<tr>
<td>CST 334</td>
<td>Project Proposal</td>
<td>1</td>
</tr>
<tr>
<td>CST 352</td>
<td>Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>CST 412</td>
<td>Senior Development Project</td>
<td>3</td>
</tr>
<tr>
<td>CST 422</td>
<td>Senior Development Project</td>
<td>3</td>
</tr>
<tr>
<td>CST 432</td>
<td>Senior Development Project</td>
<td>2</td>
</tr>
<tr>
<td>CST 415</td>
<td>Computer Networks</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CST Technical Electives*</td>
<td>9</td>
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<tr>
<td></td>
<td>MATH Elective**</td>
<td>3/4</td>
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<tr>
<td>MATH 465</td>
<td>Mathematical Statistics</td>
<td>4</td>
</tr>
<tr>
<td>WRI 327</td>
<td>Advanced Technical Writing</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>WRI 350</td>
<td>Documentation Development</td>
<td>3</td>
</tr>
</tbody>
</table>

**Embedded Systems Engineering Technology**

**Degree Offered**
Bachelor of Science in Embedded Systems Engineering Technology

**Required Student Equipment**
Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

**Career Opportunities**
The Department of Computer Systems Engineering Technology offers a Bachelor of Science degree in Embedded Systems Engineering Technology (ESET) designed to build and enhance student’s knowledge and skills in this high demand field. Embedded systems play an important role in society. They are the products that contain computing capabilities which are found throughout a wide spectrum of applications. Examples of embedded systems can be found in areas ranging from the entertainment industry to office systems; health care to telecommunications. Embedded systems encompass such diverse products as interactive multimedia, printers, medical equipment, avionics equipment, kitchen appliances, mobile phones, and automotive engine management units. Engineering and technological challenges abound in the design and development of such innovative products due to the high level integration of hardware and software. As they become more complex and time to market shrinks there is increasing need for skill and creativity on the part of the Embedded System Engineering Technology graduate.

If you want to:
- develop skills in design and implementation of firmware for embedded systems,
- expand knowledge and apply new ideas in practical design,
- gain hands-on experience in embedded system design,
- bridge the gap between software and hardware design,
- enhance your career opportunities in a variety of high demand areas of industrial applications, then the Embedded Systems Engineering Technology Program is the place for you.

**Objective of the Curriculum**
The goal of the Embedded Systems Program is to prepare students with the skills demanded by real-world industrial applications. Key to this process is the direct involvement of the embedded systems industries. Specific areas of preparation include:
- Embedded systems design methods—methods and techniques specific to the creation of an embedded system that integrates both software and hardware to fulfill a set of requirements.
- Software engineering methods—methods specific to development of software for embedded systems, including implementation, maintenance and testing.
- Systems software development—device driver development, multiprocessing control systems, and the software necessary to directly access and manipulate hardware.
- Architectural elements of embedded systems—methods and techniques for designing and implementing hardware components for embedded systems such as application-specific integrated circuits and System-On-a-Chip (SoC) technology.
- Real-time high-reliability and high availability processing—methods and techniques necessary for understanding, evaluating and addressing quality attributes most often associated with embedded systems such as real-time deadlines, high availability, survivability, and safety.
- Data communications—methods and techniques for developing distributed systems within embedded environments that use physical or wireless networking.

**Cooperative Field Experience**
The cooperative program includes work experience during the junior and senior years. The
co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

Degree Requirements
The Bachelor of Science in Embedded Systems Engineering Technology requires 196 credit hours as prescribed by the curriculum outline.

Bachelor of Science in Embedded Systems Engineering Technology

Curriculum
Required courses and recommended terms during which they should be taken:

**Freshman Year**
- **Fall**
  - CST 116 C++ Programming I 4
  - CST 162 Digital Logic I 4
  - MATH 111 College Algebra 4
  - WRI 121 English Composition 3
  - **Total** 15

- **Winter**
  - CST 126 C++ Programming II 4
  - CST 130 Computer Organization 3
  - MATH 112 Trigonometry 4
  - SPE 111 Public Speaking 3
  - WRI 122 Argumentative Writing 3
  - **Total** 17

- **Spring**
  - CST 120 Embedded C 4
  - CST 131 Computer Architecture 3
  - CST 136 Object-Oriented Programming with C++ 4
  - MATH 251 Differential Calculus 4
  - **Total** 15

**Sophomore Year**
- **Fall**
  - CST 133 Digital Logic II 4
  - CST 134 Instrumentation 1
  - CST 250 Computer Assembly Language 4
  - CST 276 Software Design Patterns 4
  - MATH 252 Integral Calculus 4
  - **Total** 17

- **Winter**
  - CST 204 Introduction to Microcontrollers 4
  - CST 231 Digital Systems Design I 4
  - EE 221 Circuits I 4
  - MATH 254N Vector Calculus I 4
  - **Total** 16

- **Spring**
  - CST 211 Data Structures 6
  - CST 240 UNIX 4
  - PSY 201 General Psychology 3
  - SPE 321 Small Group and Team Communication 3
  - **Total** 14

**Junior Year**
- **Fall**
  - CST 315 Embedded Sensor Interfacing and I/O 4
  - CST 337 Embedded System Architecture 5
  - CST 371 Embedded Systems Development I 4
  - PHY 221 General Physics with Calculus 4
  - **Total** 17

- **Winter**
  - CST 347 Real-Time Embedded Operating Systems 4
  - CST 372 Embedded Systems Development II 3
  - PHY 222 General Physics with Calculus 4
  - MATH 465 Mathematical Statistics 4
  - **Total** 15

- **Spring**
  - CST 334 Project Proposal 1
  - CST 373 Embedded Systems Development III 2
  - CST 417 Embedded Networking 4
  - WRI 227 Technical Report Writing 3
  - Laboratory Science Elective 4
  - Humanities Elective 3
  - **Total** 17

**Senior Year**
- **Fall**
  - BUS 304 Engineering Management 3
  - CST 412 Senior Development Project 3
  - CST 455 System on a Chip Design 4
  - Humanities Elective 3
  - Social Science Elective 3
  - **Total** 16

- **Winter**
  - CST 422 Senior Development Project 3
  - CST 456 Embedded System Testing 4
  - MGT 345 Engineering Economy 3
  - WRI 350 Documentation Development 3
  - Social Science Elective 3
  - **Total** 16

- **Spring**
  - ANTH 452 Globalization 3
  - CST 432 Senior Development Project 2
  - CST 466 Embedded System Security 3
  - Humanities Elective 3
  - Technical Elective 3
  - **Total** 14

Total Credits Required for B.S. in Embedded Systems Engineering Technology: 189

Tech Elective: One additional CST upper division course.
Software Engineering Technology

Degrees Offered
Bachelor of Science in Software Engineering Technology
Associate of Engineering in Software Engineering Technology

Students who complete the curriculum requirements in Software Engineering Technology will be qualified and knowledgeable in the establishment and use of sound engineering principles (methods) in order to create software of all types that is reliable and works on real machines.

Required Student Equipment
Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own a computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

Career Opportunities
Bachelor of Science in Software Engineering Technology degree graduates find employment as software engineers, systems engineers, systems analysts, programmer/analysts, researchers and assistants, consultants, customer engineers, etc., responsible for the application, design, development, and implementation of software in all areas of industry, government and education.

Software engineering technologists’ career paths will be many and varied. They may concentrate on hardware-support activities such as new design/development, testing, customer service and the like. They may concentrate on software specification, design, construction and testing through implementation and maintenance.

Graduates may get involved with administrative or project management by beginning as a member of an applications development team and progressing into management. They may pursue careers in product development, marketing, sales, design, and support. Students completing the requirements for the Associate of Engineering degree should consider themselves as entry-level trainees in the careers mentioned.

High School Preparation
Coursework in computer science, mathematics, and physical science will aid students in their progress in this program.

Bachelor Program Mission
The mission of the Software Engineering Technology (SET) Bachelor’s Degree Program within Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for productive careers in industry and government by providing an excellent education incorporating industry-relevant, applied laboratory-based instruction in both the theory and application of software engineering. The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET Program’s mission in the CSET Department are:

- To educate a new generation of Software Engineering Technology students to meet current and future industrial challenges and emerging software trends;
- To promote a sense of scholarship, leadership and professional service among our graduates;
- To enable our students to create, develop, apply and disseminate knowledge within the software development environment;
- To expose our students to cross-disciplinary educational programs;
- To provide government and high tech industry employers with graduates in software engineering and related professions.

Bachelor Program Educational Objectives
The Program Educational Objectives of Oregon Tech’s Software Engineering Technology Program are to produce graduates that:

- Will communicate effectively and successfully, both individually and within multi-disciplinary teams.
- Will assist in solving computer systems problems using their knowledge of computer programming;
- Regularly engage in learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems;
- Will be an effective software development team member that contributes innovative software design solutions to the resolution of business, scientific or government computer systems problems;
- Will provide government and high tech industry employers with entry level graduates in computer programming and related professions.

Cooperative Field Experience
The cooperative program includes work experience usually during the junior and senior years. The co-op period would be an employment arrangement with an employer in the area of the student’s major field with normal salary and academic credit. These arrangements are made on an individual basis, and the student is under no obligation to accept permanent employment with any previous cooperating employer. A student...
must be ready to enter the sophomore year in Software Engineering Technology to be considered for this program

**Accreditation**
The Software Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

**Degree Requirements**
Associate of Engineering Technology degree students must complete 96 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Software Engineering Technology degree requires 187 credit hours as prescribed by the curriculum outline.

## Bachelor of Science in Software Engineering Technology Curriculum
Required courses and recommended terms during which they should be taken:

### Freshman Year
- **Fall**
  - CST 116: C++ Programming I 4
  - CST 162: Digital Logic I 4
  - MATH 111: College Algebra 4
  - WRI 121: English Composition 3
  - **Total**: 15

- **Winter**
  - CST 126: C++ Programming II 4
  - CST 130: Computer Organization 3
  - MATH 112: Trigonometry 4
  - SPE 111: Public Speaking 3
  - WRI 122: Argumentative Writing 3
  - **Total**: 17

### Freshman Year
- **Spring**
  - CST 120: Embedded C 4
  - CST 131: Computer Architecture 3
  - CST 136: Object-Oriented Programming with C++ 4
  - MATH 251: Differential Calculus 4
  - **Total**: 15

### Sophomore Year
- **Fall**
  - CST 250: Computer Assembly Language 4
  - CST 276: Software Design Patterns 4
  - MATH 252: Integral Calculus 4
  - WRI 227: Technical Report Writing 3
  - **Total**: 15

- **Winter**
  - CST 211: Data Structures 4
  - CST 240: UNIX 4
  - MATH 254N: Vector Calculus I 4
  - PSY 201: General Psychology 3
  - **Total**: 15

### Sophomore Year
- **Spring**
  - CST 223: Concepts of Programming Languages 3
  - CST 236: Software Systems Testing 4
  - CST 238: Graphical User Interface Programming 4
  - MATH 327: Discrete Mathematics 4
  - **Total**: 15

### Junior Year
- **Fall**
  - CST 229: Introduction to Grammars 3
  - CST 316: Junior Team-Based Project Development I 4
  - CST 324: Database Systems and Design 4
  - PHY 221: General Physics with Calculus 4
  - SPE 321: Small Group and Team Communication 3
  - **Total**: 18

- **Winter**
  - CST 320: Compiler Methods 4
  - CST 326: Junior Team-Based Project Development II 4
  - PHY 222: General Physics with Calculus 4
  - WRI 350: Documentation Development 3
  - **Total**: 15

- **Spring**
  - CST 334: Project Proposal 1
  - CST 336: Junior Team-Based Project Development III 4
  - PHY 223: General Physics with Calculus 4
  - Social Science Elective 3
  - **Total**: 16

### Senior Year
- **Fall**
  - BUS 304: Engineering Management 3
  - CST 412: Senior Development Project 3
  - CST 415: Computer Networks 4
  - Humanities Elective 3
  - Technical Elective* 3
  - **Total**: 16

- **Winter**
  - CST 422: Senior Development Project 3
  - MATH 465: Mathematical Statistics 4
  - Humanities Elective 3
  - Social Science Elective 3
  - Technical Elective* 3
  - **Total**: 16

- **Spring**
  - ANTH 452: Globalization 3
  - MATH 465: Mathematical Statistics 4
  - Humanities Elective 3
  - Technical Elective* 3
  - **Total**: 14

**Total Credits Required for B.S. in Software Engineering Technology: 187**

* Three additional CST upper division courses.
One CST upper division elective course may be exchanged for an upper division MATH course.
# Associate of Engineering in Software Engineering Technology

**Curriculum**

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
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</thead>
<tbody>
<tr>
<td>CST 116</td>
<td>C++ Programming I</td>
</tr>
<tr>
<td>CST 162</td>
<td>Digital Logic I</td>
</tr>
<tr>
<td>MATH 111</td>
<td>College Algebra</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<table>
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<tbody>
<tr>
<td>CST 126</td>
<td>C++ Programming II</td>
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<td>CST 130</td>
<td>Computer Organization</td>
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<td>MATH 112</td>
<td>Trigonometry</td>
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<td>SPE 111</td>
<td>Public Speaking</td>
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<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
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<table>
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<tbody>
<tr>
<td>CST 120</td>
<td>Embedded C</td>
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<tr>
<td>CST 131</td>
<td>Computer Architecture</td>
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<td>CST 136</td>
<td>Object-Oriented Programming with C++</td>
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<tr>
<td>MATH 251</td>
<td>Differential Calculus</td>
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<table>
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<tbody>
<tr>
<td>CST 276</td>
<td>Software Design Patterns</td>
</tr>
<tr>
<td>MATH 252</td>
<td>Integral Calculus</td>
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<td>PSY 201</td>
<td>General Chemistry</td>
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<tr>
<td>WRI 227</td>
<td>Technical Report Writing</td>
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<table>
<thead>
<tr>
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<th>Winter</th>
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<tbody>
<tr>
<td>CST 211</td>
<td>Data Structures</td>
</tr>
<tr>
<td>CST 240</td>
<td>UNIX</td>
</tr>
<tr>
<td>PHY 221</td>
<td>General Physics with Calculus</td>
</tr>
<tr>
<td>Humanities Elective</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>CST 233</td>
<td>Concepts of Programming Languages</td>
</tr>
<tr>
<td>CST 236</td>
<td>Software Systems Testing</td>
</tr>
<tr>
<td>CST 238</td>
<td>Graphical User Interface Programming</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
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</tbody>
</table>

**Total Credits Required for Associate of Engineering in Software Engineering Technology:** 96

* See your advisor for acceptable Elective classes.
Dental Hygiene Department

Jill Schultz, Department Chair
Professor: J. Schultz
Associate Professor: J. Cope, S. Hopper
Assistant Professors: C. Devens, E. Gordon, V. Points, P. Russell
Instructors: K. Clarke, H. Denton, P. Hendrix, S. Shivji, K. Sroufe

Degrees Offered
Bachelor of Science in Dental Hygiene
Associate of Applied Science in Dental Hygiene

A Bachelor of Science in Dental Hygiene is offered on the Oregon Tech Klamath Falls campus and on the Chemeketa Community College campus in Salem.
An Associate of Applied Science in Dental Hygiene is offered at ODS College of Dental Sciences in La Grande.

Accreditation
The dental hygiene curriculum is accredited with no reporting requirements by the American Dental Association Commission on Dental Accreditation, a specialized accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. The program is recognized by the Oregon Board of Dentistry, Oregon Dental Association and the Oregon Dental Hygienists’ Association.

Program Purpose and Mission Statement
The dental hygiene programs prepare students to enter the dental hygiene profession as registered dental hygienists. Graduates are prepared for national and regional examinations and to meet qualifications for licensure. Bachelor degree graduates are prepared for post graduate education in dental hygiene and other related fields of study.
The dental hygiene faculty strives to make a difference in students’ lives by helping them achieve their goals. An atmosphere of respect within a safe learning environment that encourages critical thinking is valued.

Program Educational Objectives
The dental hygiene graduate will be competent in:
1. Applying ethical, legal and regulatory concepts in the provision and/or support of oral health care services.
2. Critical thinking and problem solving related to comprehensive care and management of patients.
3. Interpersonal and communication skills to effectively interact with diverse population groups.
4. Assessing, planning, implementing and evaluating community-based oral health programs including health promotion and disease prevention activities.
5. Providing oral health care to individuals at all stages of life and for all periodontal classifications.

Career Opportunities
Dental hygienists are most commonly employed in private dental practices and provide oral health preventive and therapeutic services. Graduates are prepared for licensure as a dental hygienist and with the qualifications to obtain permits and endorsements for expanded practice in such settings as nursing homes, schools, and hospitals. In addition to clinical practice, dental hygienists have careers in the fields of education, research, administration, and public health.

Student Preparation
A science background is beneficial to individuals interested in any health sciences profession. Students considering a career in dental hygiene should take a college-bound course of study in high school that includes algebra, chemistry, and biology or human anatomy and physiology.

Admissions Procedures
Any student who meets the OIT general admissions requirements may enroll in Pre-Dental Hygiene courses (freshman year). A limited number of seats are available in the professional courses (sophomore, junior, and senior years). Students are selected to enter the professional program through an application process.

The application deadline is in April of the calendar year of enrollment. To be eligible for admission into the Dental Hygiene Program the following minimum eligibility requirements must be met:
1. Applicants must have on file with the Oregon Tech Office of Admissions an official Application for Admission to Oregon Tech, accompanied by a $50 non-refundable fee and official transcripts of each college or university attended. Admission to Oregon Tech is independent of admission to the Dental Hygiene Program. All applicants to Oregon Tech are admitted as pre-dental hygiene majors until accepted into the dental hygiene program.
2. Applicants must have successfully completed or be in progress of completing all freshmen pre-dental hygiene courses. Completion of Introduction to Dental Hygiene (DH 100 on campus or DHE 100 online) is required by the end of spring term. All other prerequisite (freshman) courses must be completed by the end of summer term.
3. Applicants must have a minimum cumulative 2.50 GPA in previous college work.
4. Applicants must submit a Dental Hygiene Application for Admission, related forms, including official transcripts, and $75 non-refundable application fee directly to the Dental Hygiene Department by the established date published on the department website. Detailed information and forms can be found on the Oregon Tech Dental Hygiene Program web page, www.oit.edu/dental-hygiene.

Program Requirements
Dental hygiene students admitted to the Dental Hygiene Program (sophomore, junior, senior years) must purchase instruments and other supplies to be used during clinical practice and pay additional fees associated with dental hygiene courses. A background check and drug test are required prior to final admission into the professional program.

Graduation Requirements
All courses listed in the curriculum for the catalog year a student begins a program must be fulfilled. Total credits required for graduation are: Bachelor of Science degree, 204; Associate of Applied Science, 163. A minimum cumulative grade point average (GPA) of 2.0 is required for graduation. Students must maintain a grade of “C” or better in all courses to continue in the program.
### Bachelor of Science in Dental Hygiene

#### Curriculum

The following are required courses and recommended terms for students attending on the Klamath Falls campus. Please visit www.oit.edu/dentalhygiene for transfer information from other Oregon colleges and for recommended course sequencing for those attending on the Chemeketa Community College campus.

#### Pre-Dental Hygiene

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>BIO 200 Medical Terminology</td>
<td>2</td>
<td>Fall</td>
</tr>
<tr>
<td>BIO 231 Human Anatomy and Physiology I</td>
<td>4</td>
<td>Fall</td>
</tr>
<tr>
<td>CHE 101 Introduction to General Chemistry</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>CHE 104 Introduction to General Chemistry Laboratory</td>
<td>1</td>
<td>Fall</td>
</tr>
<tr>
<td>DH 100 Introduction to Dental Hygiene</td>
<td>2</td>
<td>Fall</td>
</tr>
<tr>
<td>MATH 100 Intermediate Algebra or higher</td>
<td>4</td>
<td>Fall</td>
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**Sophomore Year**

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>DH 222 Dental Hygiene Clinical Practice and Seminar II</td>
<td>4</td>
<td>Winter</td>
</tr>
<tr>
<td>DH 241 Prevention II</td>
<td>3</td>
<td>Winter</td>
</tr>
<tr>
<td>DH 244 General and Oral Pathology</td>
<td>3</td>
<td>Winter</td>
</tr>
<tr>
<td>DH 252 Oral Radiology</td>
<td>3</td>
<td>Winter</td>
</tr>
<tr>
<td>DH 275 Dental Ethics</td>
<td>2</td>
<td>Winter</td>
</tr>
<tr>
<td>SPE 321 Small Group and Team Communication</td>
<td>3</td>
<td>Winter</td>
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**Junior Year**

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>DH 223 Dental Hygiene Clinical Practice and Seminar III</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>DH 242 Prevention III</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>DH 253 Oral Radiology II</td>
<td>2</td>
<td>Spring</td>
</tr>
<tr>
<td>DH 254 Introduction to Periodontology</td>
<td>1</td>
<td>Spring</td>
</tr>
<tr>
<td>DH 267 Emergency Procedures</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>DH 380 Community Dental Health I Social Science Elective</td>
<td>2</td>
<td>Spring</td>
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**Senior Year**

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<tbody>
<tr>
<td>DH 321 Dental Hygiene Clinical Practice and Seminar IV</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>DH 340 Prevention IV</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>DH 354 Periodontology</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>DH 381 Community Dental Health II Psychology Elective</td>
<td>3</td>
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**Total Credits Required for B.S. in Dental Hygiene:** 204
### Associate of Applied Science in Dental Hygiene

#### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Dental Hygiene

<table>
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<tr>
<th>Term</th>
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<tr>
<td>Freshman</td>
<td>BIO 200 Medical Terminology</td>
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<td></td>
<td>BIO 231 Human Anatomy and Physiology I</td>
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<td></td>
<td>CHE 104 Introduction to General Chemistry Laboratory</td>
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<td>DHE 100 Introduction to Dental Hygiene I</td>
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<tr>
<td></td>
<td>MATH 105 or College Mathematics</td>
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<td>MATH 111 College Algebra</td>
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<tr>
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<tbody>
<tr>
<td>Freshman</td>
<td>BIO 105 Microbiology</td>
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<td>BIO 232 Human Anatomy and Physiology II</td>
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<td></td>
<td>CHE 102 Introduction to Organic Chemistry</td>
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<td></td>
<td>CHE 105 Introduction to Organic Chemistry I</td>
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<tr>
<td></td>
<td>SPE 111 Public Speaking</td>
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<td>WRI 121 English Composition</td>
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<table>
<thead>
<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Freshman</td>
<td>BIO 205 Nutrition</td>
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<td></td>
<td>BIO 233 Human Anatomy and Physiology III</td>
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<td>CHE 106 Introduction to Biochemistry Laboratory</td>
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<td>SOC 204 Introduction to Sociology</td>
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<td>WRI 122 Argumentative Writing</td>
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#### Professional Courses

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<tr>
<td>Sophomore</td>
<td>CHE 360 Clinical Pharmacology for the Health Professions</td>
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<td>DHE 211 Principles of Dental Hygiene I</td>
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<td>DHE 252 Oral Radiology I</td>
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<td>DHE 286 Medical and Dental Emergency Procedures</td>
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<tbody>
<tr>
<td>Sophomore</td>
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<td>DHE 222 Dental Hygiene Clinical Practice II</td>
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<td>DHE 225 Head and Neck Anatomy, Histology, and Embryology</td>
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<td>DHE 244 General and Oral Pathology</td>
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<td>DHE 253 Oral Radiology II</td>
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<td>DHE 275 Dental Ethics</td>
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#### Sophomore Year

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<tr>
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<tr>
<td>Fall</td>
<td>DHE 213 Principles of Dental Hygiene III</td>
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<td>DHE 223 Dental Hygiene Clinical Practice III</td>
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<td>DHE 233 Periodontology</td>
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<td></td>
<td>DHE 261 Dental Health Education</td>
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<td>DHE 344 Advanced General and Oral Pathology</td>
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#### Junior Year

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<tr>
<td>Summer</td>
<td>DHE 311 Principles of Dental Hygiene IV</td>
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<td>DHE 321 Dental Hygiene Clinical Practice IV</td>
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<td>DHE 333 Periodontology</td>
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<td>DHE 351 Dental Analgesia</td>
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<td></td>
<td>DHE 380 Oral Health Planning and Care I</td>
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<td>DHE 461 Restorative Dentistry I</td>
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<table>
<thead>
<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Fall</td>
<td>DHE 312 Principles of Dental Hygiene V</td>
</tr>
<tr>
<td></td>
<td>DHE 322 Dental Hygiene Clinical Practice V</td>
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<tr>
<td></td>
<td>DHE 381 Oral Health Planning and Care II</td>
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<td>DHE 462 Restorative Dentistry II</td>
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<td>Psychology Elective</td>
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<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Winter</td>
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<td>DHE 323 Dental Hygiene Clinical Practice VI</td>
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<td>DHE 463 Restorative Dentistry III</td>
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<td></td>
<td>WRI 227 Technical Report Writing</td>
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<td></td>
<td>Humanities Elective</td>
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<td>Psychology Elective</td>
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#### Total Credits Required for A.A.S. in Dental Hygiene: 163

### Bachelor’s Degree Completion Outreach Program

This program offers dental hygienists who have earned an associate’s degree the opportunity to complete a Bachelor of Science in Dental Hygiene. The degree is offered through Oregon Tech Online.

Dental hygienists who have graduated with an associate’s degree from an accredited dental hygiene program may be eligible to apply to the bachelor’s degree completion program. Oregon Tech will make every effort to give maximum consideration to the transfer work presented at time of application. Typically, most professional and related science requirements are accepted. Additional coursework may be necessary to meet Oregon Tech general education requirements and a minimum of 45 credit hours must be completed through Oregon Tech to satisfy residency requirements.

#### Courses Granted for Licensure

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>DH 100</td>
<td>Introduction to Dental Hygiene</td>
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</tr>
<tr>
<td>DH 221/22/23</td>
<td>Dental Hygiene Clinical Practice Seminar I, II, and III</td>
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<tr>
<td>DH 225</td>
<td>Head and Neck Anatomy, Histology And Embryology</td>
<td>3</td>
</tr>
<tr>
<td>DH 240/241/242</td>
<td>Prevention I, II, and III</td>
<td>9</td>
</tr>
<tr>
<td>DH 244</td>
<td>General and Oral Pathology</td>
<td>3</td>
</tr>
<tr>
<td>DH 252/253</td>
<td>Oral Radiology I and II</td>
<td>5</td>
</tr>
<tr>
<td>DH 254</td>
<td>Introduction to Periodontology</td>
<td>1</td>
</tr>
<tr>
<td>DH 267</td>
<td>Emergency Procedures</td>
<td>3</td>
</tr>
<tr>
<td>DH 275</td>
<td>Dental Ethics</td>
<td>2</td>
</tr>
<tr>
<td>DH 321/322/323</td>
<td>Dental Hygiene Clinical Practice Seminar IV, V, and VI</td>
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<tr>
<td>DH 340/341</td>
<td>Prevention IV and V</td>
<td>6</td>
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<tr>
<td>DH 344</td>
<td>Advanced General and Oral Pathology</td>
<td>3</td>
</tr>
<tr>
<td>DH 354</td>
<td>Periodontology</td>
<td>3</td>
</tr>
<tr>
<td>DH 363</td>
<td>Dental Materials</td>
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<tr>
<td>DH 366</td>
<td>Dental Anatomy</td>
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</tr>
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<td>DH 380/381</td>
<td>Community Dental Health I</td>
<td>4</td>
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<tr>
<td>DH 421/422/423</td>
<td>Dental Hygiene Clinical Practice Seminar VII, VIII, IX</td>
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## Oregon Tech Degree Completion Courses

<table>
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<tr>
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<td>Instructional Methods</td>
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<td>Personal Finance</td>
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<tr>
<td>DH 352</td>
<td>Pain Management II*</td>
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<tr>
<td>DH 401</td>
<td>Overview of Advanced Dental Hygiene</td>
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</tr>
<tr>
<td>DH 453</td>
<td>Current Issues in Dental Hygiene</td>
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</tr>
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<td>DH 454</td>
<td>Dental Practice Management</td>
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<td>DH 455</td>
<td>Dental Hygiene Research</td>
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<td>DH 470</td>
<td>Community Program Planning I</td>
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<td>MATH 243</td>
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<tr>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
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<tr>
<td></td>
<td>Communication Elective</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Social Science Elective</td>
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<tr>
<td></td>
<td>Elective approved by advisor</td>
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</tbody>
</table>

## Graduation Requirements:

The following requirements must be met to earn a bachelor’s degree in dental hygiene from Oregon Institute of Technology:

- Transfer your dental hygiene professional courses.
- Complete general education courses required for a bachelor's degree.
- Complete the bachelor's degree completion courses.
- Complete 60 credits of upper-division (300-400 level) coursework. (You will be awarded some upper-division credit for your transferred professional courses.)
- Complete at least 45 credits from Oregon Tech.
- Maintain a grade “C” or better in all courses.

## Additional required courses

(Transfer or Oregon Tech)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 105</td>
<td>Microbiology</td>
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<tr>
<td>BIO 200</td>
<td>Medical Terminology</td>
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<td>BIO 205</td>
<td>Nutrition</td>
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<tr>
<td>BIO 231</td>
<td>Anatomy and Physiology I</td>
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</tr>
<tr>
<td>BIO 232</td>
<td>Anatomy and Physiology II</td>
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<tr>
<td>BIO 233</td>
<td>Anatomy and Physiology III</td>
<td>4</td>
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<tr>
<td>CHE 101/104</td>
<td>Introduction to General Chemistry / Laboratory</td>
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<tr>
<td>CHE 102/105</td>
<td>Introduction to Organic Chemistry / Laboratory</td>
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</tr>
<tr>
<td>CHE 103/106</td>
<td>Introduction to Biochemistry / Laboratory</td>
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<td>CHE 360</td>
<td>Clinical Pharmacology for the Health Professions</td>
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<tr>
<td>MATH 105</td>
<td>Collegiate Mathematics</td>
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<tr>
<td>or</td>
<td>MATH 111 College Algebra</td>
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<td>SOC 204</td>
<td>Introduction to Sociology</td>
<td>3</td>
</tr>
<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
<td>3</td>
</tr>
<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRI 123</td>
<td>Research Writing</td>
<td></td>
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<tr>
<td>or</td>
<td>WRI 227 Technical Report Writing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Humanities Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

* Credits may be granted for additional specialty licensure exams.
Electrical Engineering and Renewable Energy Department

Cristina Crespo, Department Chair
Mehmet Vurkac, Program Director, B.S. Electrical Engineering (Klamath Falls)
Jamie Zipay, Program Director, B.S. Renewable Energy Engineering (Klamath Falls)
Aaron Scher, Program Director, B.S. Electrical Engineering and B.S. Electronics Engineering Technology (Wilsonville)
Scott Prahl, Program Director, Optical Engineering (Wilsonville)
Claudia Torres Garibay, Program Director, B.S. Renewable Energy Engineering (Wilsonville)

Degrees offered
Bachelor of Science in Electrical Engineering
Bachelor of Science in Electrical Engineering and Optical Engineering (dual major)
Bachelor of Science in Electrical Engineering and Systems Engineering & Technical Management (dual major)
Bachelor of Science in Electrical Engineering and Bachelor of Science in Renewable Energy Engineering (dual degree)
Bachelor of Science in Electrical Engineering and Master of Science in Renewable Energy Engineering (4+1 co-terminal degree)

Note: The BS Electrical Engineering is offered in both the Klamath Falls and Wilsonville campuses. The different degree options (technical emphases, dual majors, etc.) may vary by campus.

Career Opportunities
The Bachelor of Science in Electrical Engineering (BSEE) at Oregon Tech is designed to prepare professionals to meet the needs of the growing Electrical Engineering industry. Electrical engineering is concerned with the use of electricity to transmit electric power, or to process information. Electrical engineers design, develop, test, and integrate electrical power systems and electrical machines, as well as electronic systems, including portable electronic devices, medical equipment, communication systems, radar and navigation systems, and others.

The program is designed around a set of core courses which provide a classical electrical engineering foundation, and a number of elective courses that allow students some flexibility to specialize in the areas that interest them most, such as electronics, electrical power, optical engineering, renewable energy, etc. Emphasis is placed on practical application of engineering knowledge. The BSEE program at Oregon Tech can accommodate full-time students, transfer students, and working professionals, and provides a solid preparation for industry or graduate school.

Graduates of the Electrical Engineering Program are prepared to fulfill a wide range of functions within industry. Employers of electrical engineering graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, and semiconductor companies, among others.

The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, MBAs, and JDs.

Program Mission and Objectives
The mission of the BS Electrical Engineering program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electrical engineering.

Graduates of the BSEE program will:
1. Possess a strong technical background as well as analytical, critical-thinking, and problem-solving skills that enable them to excel as professionals contributing to a variety of engineering roles within the various fields of Electrical Engineering and the high-tech industry;
2. Be employed in Electrical Engineering positions including (but not limited to) design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers;
3. Be committed to professional development and lifelong learning by engaging in professional or graduate education in order to stay current in their field and achieve continued professional growth;
4. Be working as effective team members possessing excellent oral and written communication skills, and assuming technical and managerial leadership roles throughout their career.
**Student Preparation**

Students entering the Electrical Engineering program from high school should have a minimum of: 1) Two years of high-school algebra and one year of high-school geometry and trigonometry. 2) Two years of a physical science (physics, chemistry preferred). 3) Three years of English composition. Additional mathematics, science, English, electronics, and computer languages are very helpful.

Students entering the Electrical Engineering program by transfer are requested to contact the department concerning transfer of technical coursework.

**Accreditation**

The BSEE program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

**Degree Requirements**

The Bachelor of Science in Electrical Engineering follows a rigorous curriculum, requiring a minimum of 184 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of “C” or better must be earned in all EE courses that are prerequisites for another EE course.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar’s office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

**Technical Emphases**

Students in the BSEE program may choose to specialize in a particular area by selecting at least three of their engineering technical elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students’ transcripts.

**Electrical Power**

Choose at least three engineering elective courses from the following list:

- EE 419 Power Electronics
- REE 243 Electrical Power
- REE 253 Electromechanical Energy Conversion
- REE 345 Wind Power
- REE 453 Power System Analysis
- REE 454 Power System Protection and Control
- Or other approved technical Electives

**Microelectronics**

Choose at least three engineering elective courses from the following list:

- EE 325 Electronics III
- EE 421 Analog IC Design
- EE 423 CMOS Digital IC Design
- EE 432 Advanced Digital System Design w/HDL
- Or other approved technical Electives

**Optical Engineering**

Choose at least three engineering elective courses from the following list:

- EE 448 Geometric Optics
- EE 449 Optical Detection & Radiometry
- EE 450 Physical Optics
- EE 451 Lasers
- EE 452 Waveguides & Fiber Optics
- EE 453 Optical Metrology
- Or other approved technical electives

Note: Optical Engineering emphasis only available at the Wilsonville campus.

**Renewable Energy**

Choose at least three engineering elective courses from the following list:

- EE 419 Power Electronics
- REE 243 Electrical Power
- REE 253 Electromechanical Energy Conversion
- REE 345 Wind Power
- REE 346 Biofuels and Biomass
- REE 412 Photovoltaic systems
- REE 413 Electric Power Conversion Systems
- REE 427 Greenhouse Gas Accounting
- Or other approved technical Electives

**Robotics, Automation, and Control**

Choose at least three engineering elective courses from the following list:

- ENGR 420 Engineering Modeling
- ENGR 421 Automation Systems
- ENGR 422 Process Control
- ENGR 423 Motion Control and Robotics
- REE 463 Energy Systems Instrumentation
- Or other approved technical electives

Note: Optical Engineering emphasis only available at the Wilsonville campus.
Bachelor of Science in Electrical Engineering
Curriculum Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
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</thead>
<tbody>
<tr>
<td>CHE 201</td>
<td>General Chemistry I*</td>
</tr>
<tr>
<td>CHE 204</td>
<td>General Chemistry I Laboratory</td>
</tr>
<tr>
<td>ENGR 101</td>
<td>Introduction to Engineering</td>
</tr>
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<td>MATH 251</td>
<td>Differential Calculus</td>
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<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<table>
<thead>
<tr>
<th>Freshman Year</th>
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<tbody>
<tr>
<td>CHE 202</td>
<td>General Chemistry II*</td>
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<td>General Chemistry II Laboratory</td>
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<td>ENGR 102</td>
<td>Introduction to Engineering II</td>
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<td>MATH 252</td>
<td>Integral Calculus</td>
</tr>
<tr>
<td>PHY 221</td>
<td>General Physics with Calculus</td>
</tr>
<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
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<td>Total</td>
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<thead>
<tr>
<th>Sophomore Year</th>
<th>Fall</th>
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<tbody>
<tr>
<td>EE 133</td>
<td>Digital Electronics I</td>
</tr>
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<td>MATH 254N</td>
<td>Vector Calculus I</td>
</tr>
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<td>PHY 222</td>
<td>General Physics with Calculus</td>
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<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
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<th>Winter</th>
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<tbody>
<tr>
<td>EE 223</td>
<td>Circuits I</td>
</tr>
<tr>
<td>MATH 321</td>
<td>Applied Differential Equations I</td>
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<td>MATH 341</td>
<td>Linear Algebra I</td>
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<tr>
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<th>Spring</th>
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<tbody>
<tr>
<td>EE 225</td>
<td>Circuits III</td>
</tr>
<tr>
<td>MATH 253N</td>
<td>Sequences and Series</td>
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<tr>
<td>WRI 227</td>
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<tr>
<th>Junior Year</th>
<th>Fall</th>
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<tbody>
<tr>
<td>EE 321</td>
<td>Electronics I</td>
</tr>
<tr>
<td>EE 331</td>
<td>Digital System Design with HDL</td>
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<td>EE 341</td>
<td>Electricity and Magnetism with Transmission Lines</td>
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<td>MGT 345</td>
<td>Engineering Economy</td>
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<th>Junior Year</th>
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<tbody>
<tr>
<td>EE 323</td>
<td>Electronics II</td>
</tr>
<tr>
<td>EE 333</td>
<td>Microcontroller Engineering</td>
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<tr>
<td>EE 343</td>
<td>Solid-State Electronic Devices</td>
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<td>MATH 465</td>
<td>Mathematical Statistics</td>
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<tr>
<td>EE 335</td>
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<td>EE 355</td>
<td>Control System Design</td>
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<td>ENGR 267</td>
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<tr>
<td>EE 430</td>
<td>Linear Systems and Digital Signal Processing</td>
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<th>Senior Year</th>
<th>Winter</th>
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<tbody>
<tr>
<td>EE 401</td>
<td>Communication Systems</td>
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<td>Capstone Project</td>
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</table>

| Total Credits Required for B.S. in Electrical Engineering: 184 |

** CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222, respectively. CHE 202/5 can be substituted with an approved 4 credit Math/Science Elective.

** EE 225 can be substituted with EE 320.

** Any course numbered EE 3XX, EE 4XX, REE 3XX, REE 4XX, or courses included in the list for a specific degree option can be used as an engineering elective (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 14 credits of engineering elective coursework.

** Choose from WRI327, WRI350, and WRI410.

Curriculum – Wilsonville Campus

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 201</td>
<td>General Chemistry I*</td>
</tr>
<tr>
<td>CHE 204</td>
<td>General Chemistry I Laboratory</td>
</tr>
<tr>
<td>EE 131</td>
<td>Digital Electronics I</td>
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<tr>
<td>MATH 251</td>
<td>Differential Calculus</td>
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<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Winter</th>
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<tbody>
<tr>
<td>CHE 202</td>
<td>General Chemistry II*</td>
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<td>CHE 205</td>
<td>General Chemistry II Laboratory</td>
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<td>EE 133</td>
<td>Digital Electronics I</td>
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<td>MATH 252</td>
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<tbody>
<tr>
<td>CST 116</td>
<td>C++ Programming I</td>
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<tr>
<td>EE 221</td>
<td>Circuits I</td>
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<td>WRI 227</td>
<td>Technical Report Writing</td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 223</td>
<td>Circuits II</td>
</tr>
<tr>
<td>ENGR 267</td>
<td>Advanced Engineering Programming</td>
</tr>
<tr>
<td>MATH 341</td>
<td>Linear Algebra I</td>
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<tr>
<td>PHY 222</td>
<td>General Physics with Calculus</td>
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<td>Total</td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 225</td>
<td>Circuits III*</td>
</tr>
<tr>
<td>MATH 253N</td>
<td>Sequences and Series</td>
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<td>PHY 223</td>
<td>General Physics with Calculus</td>
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<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall</th>
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<tbody>
<tr>
<td>EE 321</td>
<td>Electronics I</td>
</tr>
<tr>
<td>EE 333</td>
<td>Microcontroller Engineering</td>
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<td>EE 341</td>
<td>Electricity and Magnetism with Transmission Lines</td>
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<td>SPE 321</td>
<td>Small Group and Team</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
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</tbody>
</table>
Bachelor of Science in Electrical Engineering (Post-Baccalaureate)

Oregon Tech Bachelor of Science in Electronics Engineering Technology graduates may complete 36 additional credits to receive a Bachelor of Science in Electrical Engineering (post-baccalaureate). Students will receive two diplomas: a BSEE degree (upon completion of the BSEE degree requirements), and a BSEE degree (upon completion of the BSEE degree requirements, which include a minimum of 36 credits from Oregon tech beyond the BSEE requirements). Students who have completed an ABET accredited BS degree in Electronics Engineering Technology from another university must complete a minimum of 45 Oregon Tech credits to receive the BS in Electrical Engineering from Oregon Tech. Students pursuing this option should contact an academic advisor to draft an academic plan that ensures all BSEE curriculum requirements are met. The following is a list of additional courses that Oregon Tech BSEE graduates are required to complete in order to meet the BSEE degree requirements.

Mathematics and Science

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHE 201/4 General Chemistry I</td>
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<tr>
<td>CHE 204 General Chemistry I Laboratory</td>
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<td>CHE 202 General Chemistry II</td>
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<td>CHE 205 General Chemistry II Laboratory</td>
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<tr>
<td>MATH 253N Series and Sequences</td>
<td>4</td>
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<tr>
<td>MATH 341 Linear Algebra I</td>
<td>4</td>
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<td>MATH 465 Mathematical Statistics</td>
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</table>

Electrical Engineering

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EE 341 Electricity and Magnetism with Transmission Lines</td>
<td>4</td>
</tr>
<tr>
<td>EE 343 Solid State Electronic Devices</td>
<td>3</td>
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<td>EE 355 Control System Design</td>
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</table>

Engineering Technical Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Elective (EE, REE)**</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Elective (EE, REE)**</td>
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</table>

Total if prior BSEE degree awarded by Oregon Tech: 36

Additional credits needed for students who completed a BSEE degree from another institution:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Engineering Elective (EE, REE)**</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Elective (EE, REE)**</td>
<td>3</td>
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<tr>
<td>Engineering Elective (EE, REE)**</td>
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</table>

Total: 45

'CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively. CHE 202/5 can be substituted with an approved 4 credit Math/Science Elective.

"Requires approval.

Bachelor of Science in Electrical Engineering with a Dual Major

Students completing the BSEE program have the option of selecting a dual major. The EERE department currently offers a dual major in Optical Engineering, and a dual major in Systems Engineering & Technical Management. Students completing a BSEE degree with a dual major will receive a single BS degree with both majors listed on their diploma and transcript. The degree is issued upon completion of the requirements for each major (some courses may be used to meet the requirements for both majors). The requirements for the dual major in Optical Engineering, as well as the dual major in Systems Engineering & Technical Management are listed under the corresponding sections of the catalog.

Dual Degree in Electrical Engineering and Renewable Energy Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees concurrently: a BS in Electrical Engineering & BS in Renewable Energy Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high growth discipline (Renewable Energy Engineering). This dual degree program takes approximately an additional year beyond the BSEE degree program (or 4.5 years total by taking courses in Summer term). To obtain both degrees (BSEE and BSREE) students must complete all of the courses required for the BSEE degree and the following BSREE courses. Consult with your advisor for details.
Electronics Engineering Technology

**Degrees Offered**

Bachelor of Science in Electronics Engineering Technology (Wilsonville)

Oregon Institute of Technology offers an ABET accredited Bachelor of Science degree in Electronics Engineering Technology (BSEET). The program is conveniently offered at the Oregon Tech Wilsonville campus, as well as the Willow Creek Center, in order to accommodate degree seeking professionals working for high-tech companies in the Portland Westside area. The Willow Creek Center is located in Hillsboro (OR), at the heart of the Portland Westside high-tech industry cluster (Silicon Forest), minutes away from companies such as Intel, Tektronix, MAXIM, Credence, Lattice, Synopsis, Quorvo, and others. Some of the core and technical elective courses for the degree are also available online and at the Oregon Tech-Wilsonville campus.

**Career Opportunities**

Electronics Engineering Technology is concerned with theory, concepts, and practice of applied electronics engineering. Emphasis is placed on the practical application of engineering knowledge. As a result, the Electronics Engineering Technology graduate possesses a combination of theoretical and practical understanding and requires minimal on-the-job training.

The BSEET program is designed to prepare graduates to assume engineering and technology positions in the electronics industry. Graduates of the BSEET program fulfill a wide range of functions within industry, typically assuming positions such as component and system design, test engineering, product engineering, field engineering, manufacturing engineering, sales or market engineering, quality control engineering, and other similar roles. The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, and MBAs.

Employers of Electronics Engineering Technology graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, semiconductor companies, and automated electronic controlled processing companies. Recent graduates have been employed at companies such as MAXIM, Tektronix, Quorvo, MSEI/Biotronik, and Intel.

**4+1 BSEET/MSREE**

Students may earn both BSEET and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSEET program who have a proven record of academic excellence have the opportunity to complete the MSREE with one additional year of coursework. Students pursuing this option follow the standard BSEET curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSEET requirements:
- Replace 9 credits of engineering Electives with one graduate-level REE sequence in Electric Power (REE 529, 549, 569) or PV Systems and Processing (REE 525, 545, 565).
- Replace 3 terms of ENGR465 - Capstone Project with 3 terms of Graduate Design Project (REE 599, 599, 599)
- To meet additional MSREE requirements:
  - Research Methods and Innovation sequence (REE 511, 512, 513)
  - Energy Engineering sequence (REE 515, 516, 517)
  - Graduate-level REE specialization sequence (REE 55x, 5xx, 5xx)
  - Graduate-level REE specialization sequence (REE 5yy, 5yy, 5yy)

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSEET and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by both EE and REE advisors. Students should contact their academic advisors for details.

**Program Mission and Objectives**

The mission of the BSEET Program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electronics.

Graduates of the BSEET program will:
1. Possess a strong technical background as well as analytical and problem solving skills, and will contribute in a variety of technical roles within the electronics and high-tech industry. Within three years of graduation, BSEET graduates are expected to be employed as test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, and similar engineering technology positions within this industry.
2. Be working as effective team members with excellent oral and written communication skills, assuming technical and managerial leadership roles throughout their career.
3. Be committed to professional development and lifelong learning by engaging in professional and/or graduate education in order to stay current in their field and achieve continued professional growth.
Student Preparation

The BSEET degree at Oregon Tech is designed to accommodate working professionals with evening delivery of upper-division and custom bridging courses. It is especially suited for working professionals with an associate degree in Electronics Engineering Technology, Microelectronics Technology, or equivalent coursework. Students entering the BSEET program by transfer are requested to contact the BSEET Program Director concerning transfer of technical coursework. The BSEET program has articulation and transfer agreements with the Electronics, Microelectronics, and Renewable Energy Technology programs at various community colleges in Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics coursework. It is recommended (but not required) that students who are transferring with an AAS degree have completed Calculus II prior to transferring to the BSEET program at Oregon Tech, since Integral Calculus is a prerequisite for most upper-division BSEET courses.

We encourage transfer students to start the advising process with Oregon Tech upon completion of the first year of their AAS degree.

Accreditation

The Electronics Engineering Technology program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements

The Bachelor of Science in Electronics Engineering Technology follows a rigorous curriculum, requiring a minimum of 188 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of “C” or better must be earned in all EE and EET courses that are prerequisites for another EE or EET course. All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar’s office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

Technical Emphases

Students in the BSEET program may choose to specialize in a particular area by selecting their engineering elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students’ transcripts.

Electrical Power

Choose technical elective courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 419</td>
<td>Power Electronics</td>
<td>4</td>
</tr>
<tr>
<td>REE 243</td>
<td>Electrical Power</td>
<td>4</td>
</tr>
<tr>
<td>REE 253</td>
<td>Electromechanical Energy Conversion</td>
<td>3</td>
</tr>
<tr>
<td>REE 345</td>
<td>Wind Power</td>
<td>3</td>
</tr>
<tr>
<td>REE 453</td>
<td>Power System Analysis</td>
<td>3</td>
</tr>
<tr>
<td>REE 454</td>
<td>Power System Protection and Control</td>
<td>3</td>
</tr>
</tbody>
</table>

Or approved technical Electives

Microelectronics

Choose technical elective courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 341</td>
<td>Electricity &amp; Magnetism with Transmission Lines</td>
</tr>
<tr>
<td>EE 343</td>
<td>Solid State Electronic Devices</td>
</tr>
<tr>
<td>EE 421</td>
<td>Analog IC Design</td>
</tr>
<tr>
<td>EE 423</td>
<td>CMOS Digital IC Design</td>
</tr>
</tbody>
</table>

Or approved technical Electives

Optical Engineering

Choose technical elective courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 448</td>
<td>Geometric Optics</td>
</tr>
<tr>
<td>EE 449</td>
<td>Optical Detection &amp; Radiometry</td>
</tr>
<tr>
<td>EE 450</td>
<td>Physical Optics</td>
</tr>
<tr>
<td>EE 451</td>
<td>Lasers</td>
</tr>
<tr>
<td>EE 452</td>
<td>Waveguides &amp; Fiber Optics</td>
</tr>
<tr>
<td>EE 453</td>
<td>Optical Metrology</td>
</tr>
</tbody>
</table>

Or approved technical electives

Note: Optical Engineering emphasis only available at Wilsonville campus.

Renewable Energy

Choose technical elective courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 419</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>REE 243</td>
<td>Electrical Power</td>
</tr>
<tr>
<td>REE 253</td>
<td>Electromechanical Energy Conversion</td>
</tr>
<tr>
<td>REE 345</td>
<td>Wind Power</td>
</tr>
<tr>
<td>REE 346</td>
<td>Biofuels and Biomass</td>
</tr>
<tr>
<td>REE 412</td>
<td>Photovoltaic systems</td>
</tr>
<tr>
<td>REE 413</td>
<td>Electric Power Conversion Systems</td>
</tr>
<tr>
<td>REE 427</td>
<td>Greenhouse Gas Accounting</td>
</tr>
</tbody>
</table>

Or advisor approved technical electives

Robotics, Automation, and Control

Choose technical Elective courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 355</td>
<td>Control System Design</td>
</tr>
<tr>
<td>ENGR 420</td>
<td>Engineering Modeling</td>
</tr>
<tr>
<td>ENGR 421</td>
<td>Automation Systems</td>
</tr>
<tr>
<td>ENGR 422</td>
<td>Process Control</td>
</tr>
<tr>
<td>ENGR 423</td>
<td>Motion Control and Robotics</td>
</tr>
<tr>
<td>REE 463</td>
<td>Energy Systems Instrumentation</td>
</tr>
</tbody>
</table>

Or other approved technical electives

Note: Robotics, Automation, and Control emphasis only available at Wilsonville campus.

Note: Courses denoted with an “x” indicate that they are only available at Wilsonville campus.
Bachelor of Science in Electronics Engineering Technology Curriculum
The curriculum map below shows the required courses, recommended sequence, and recommended terms during which they should be taken for students transferring into the program with an accredited AAS degree or equivalent lower division coursework (freshman and sophomore years).

Transfer students and part-time students should contact the BSEET program director to develop a customized curriculum tailored to their individual needs.

Freshman and Sophomore Years
The degree requirements for the first two years can be fulfilled by completing an accredited Associate of Applied Science degree in Electronics Engineering Technology, Microelectronics Engineering Technology, Microelectronics Technology, Electrical Engineering Transfer, Renewable Energy Technology, or equivalent coursework. Oregon Tech has articulation agreements with various community colleges throughout Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics courses at Oregon Tech. In addition to the electronics courses, students should complete the programming, math and science, communication, and general education courses specified below during the Freshman and Sophomore years while completing their AAS degree in order to be able to complete the upper-division (Junior and Senior) BSEET courses at Oregon Tech in two years. Below is a list of courses to satisfy the requirements for the first two years of the degree. Completion of all these courses is not required to be able to transfer, but it is recommended for 2+2 transferability.

Communication (12 credits)
SPE 111 Public Speaking 3
WRJ 121 English Composition 3
WRJ 122 Argumentative Writing 3
WRJ 227 Technical Report Writing 3

General Education (12 credits)
Humanities Elective 6
Social Science Elective 6

Mathematics and Science (32 credits)
MATH 111 College Algebra 4
MATH 112 Trigonometry 4
MATH 251 Differential Calculus 4
MATH 252 Integral Calculus 4
PHY 221 General Physics with Calculus 4
PHY 222 General Physics with Calculus 4
PHY 223 General Physics with Calculus 4
Statistics Elective 4

Electronics (36 credits)
EE 121 Fundamentals of Electric Circuits I 4
EE 123 Fundamentals of Electric Circuits II 4
EE 131 Digital Circuits I 4
EE 133 Digital Circuits II 4
EE 219 Introduction to Semiconductor Devices and Amplifiers 4

Programming (4 credits)
CST 116 C++ Programming I 4

Upper Division Courses

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 254N Vector Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 321 Applied Differential Equations I</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 320 Advanced Circuit and Systems Analysis</td>
<td>5</td>
</tr>
<tr>
<td>EE 321 Electronics I</td>
<td>5</td>
</tr>
<tr>
<td>MGT 345 Engineering Economy</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 323 Electronics II</td>
<td>5</td>
</tr>
<tr>
<td>EE 331 Digital System Des w/HDL</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 367 Engineering Programming</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 325 Electronics III</td>
<td>5</td>
</tr>
<tr>
<td>EE 432 Advanced Digital system Design w/HDL</td>
<td>4</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPE 321 Small Group and Team Communication</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Writing Elective”</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 333 Microcontroller Engineering</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 465 Capstone Project</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Elective”</td>
<td>3</td>
</tr>
<tr>
<td>Humanities Elective</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 335 Adv. Microcontroller Engineering</td>
<td>4</td>
</tr>
<tr>
<td>EE 430 Linear Systems and Digital Signal Processing</td>
<td>5</td>
</tr>
<tr>
<td>ENGR 465 Capstone Project</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Elective”</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 401 Communication Systems</td>
<td>5</td>
</tr>
<tr>
<td>ENGR 465 Capstone Project</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Elective”</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

* Choose from MATH243, MATH361, and MATH465.
** Lower Division Technical electives include CST112, CST136, and other approved 200-level engineering or engineering technology courses.
*** Choose from WRJ127, WRJ150, and WRJ140.
**** Upper division EE or REE courses (except EE311, EE320, and EE347), or courses included in the list for a specific degree option (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 9 credits of engineering elective coursework.

Total credits required for B.S. in Electronics Engineering Technology: 188
Renewable Energy Engineering

Degrees Offered
- Bachelor of Science in Renewable Energy Engineering
- Bachelor of Science in Renewable Energy Engineering and Optical Engineering (dual major)
- Bachelor of Science in Renewable Energy Engineering and Systems Engineering & Technical Management (dual major)
- Bachelor of Science in Renewable Energy Engineering and Bachelor of Science in Electrical Engineering (dual degree)
- Bachelor of Science in Renewable Energy Engineering and Bachelor of Science in Environmental Science (dual degree)
- Bachelor of Science in Renewable Energy Engineering and Master of Science in Renewable Energy Engineering (4+1 co-terminal degree)
- Master of Science in Renewable Energy Engineering

Note: The BS Renewable Energy Engineering is offered in both the Klamath Falls and Wilsonville campuses. The different degree options (technical emphases, dual majors, etc.) may vary by campus. The MS Renewable Energy Engineering is offered at the Wilsonville campus.

Career Opportunities
Program graduates will enter energy careers as power engineers, PV/semiconductor processing engineers, facilities and energy managers, energy system integration engineers, HVAC and M/E/P engineers, design and modeling engineers for net-zero energy buildings, biofuels plant and operations engineers, energy systems control engineers, power electronics engineers, utility program managers, as well as renewable energy planners and policy makers. Graduates of the program will be able to pursue a wide range of career opportunities, not only within the emerging field of renewable energy, but within more traditional areas of energy engineering as well.

Employers of Renewable Energy Engineering graduates include consulting engineering firms, fuel cell manufacturers, power converter manufacturers, public utilities, government agencies, photovoltaic manufacturers, and energy developers. Recent graduates have been employed at companies such as Advanced Energy, Jacobs Engineering, Power Engineers, and Iberdrola Renewables.

Bachelor of Science in Renewable Energy Engineering
The Bachelor of Science in Renewable Energy Engineering (BSREE) prepares students for the challenges of designing, promoting and implementing renewable energy engineering in society’s rapidly-changing energy-related industries. Energy, in its many abundant forms, is the driving physical factor upon which industrial societies are founded. As geopolitical, environmental and geological factors act to constrain traditional resources, societies have been forced to re-think and re-develop their energy infrastructures. Renewable energy resources include solar thermal collectors, photovoltaics, ground-source heat pumps, geothermal resources, hydroelectric power, wind power, tidal and wave power, biofuels and fuel cells. Oregon Tech’s Bachelor of Science in Renewable Energy Engineering prepares students for success in these rapidly developing fields.

The BSREE program is built upon a solid foundation in physics, chemistry, mathematics and communications. Added to this foundation are courses in electrical and mechanical engineering that establish a firm understanding of the fundamentals of energy. The engineering coursework prepares students for renewable energy-specific courses such as photovoltaics, wind power, biofuels, hydroelectric, fuel cells and solar thermal systems. These courses are then integrated into system-wide senior level courses such as energy system design, energy-efficient building systems, renewable energy transportation systems, energy management and energy systems control.

Program Mission and Objectives
The mission of the Bachelor of Science in Renewable Energy Engineering program is to prepare students for the challenges of designing, promoting and implementing renewable energy solutions within society’s rapidly-changing energy-related industry cluster, particularly within Oregon and the Pacific Northwest. Graduates will have a fundamental understanding of energy engineering and a sense of social responsibility for the implementation of sustainable energy solutions.

Graduates from the BSREE program will:
1. Excel as professionals in the various fields of energy engineering.
2. Be known for their commitment to lifelong learning, social responsibility, and professional and ethical responsibilities in implementing sustainable engineering solutions.
3. Excel in critical thinking, problem solving and effective communication.
**Student Preparation**

High school students should be prepared to start their college academic work with at least college calculus and Freshman English composition. Typically, this means the successful new student has completed:
1. Four years of high school mathematics including algebra I and II, geometry and trigonometry
2. Four years of English composition/writing
3. Four years of science including physics and chemistry

Students entering the program by transfer are requested to contact the program director for evaluation of REE-related transfer courses.

**Accreditation**

The Renewable Energy Engineering baccalaureate program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

**Degree Requirements**

The Bachelor of Science in Renewable Energy Engineering follows a rigorous curriculum, requiring a minimum of 184/185 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of “C” or better must be earned in all courses with MATH, CHE, PHY, EE, ENGR, MECH, and REE prefixes. Students must also earn a grade of “C” or better in all courses listed as prerequisites for these courses.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar’s office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

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### Bachelor of Science in Renewable Energy Engineering

#### Curriculum – Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 201</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>CHE 204</td>
<td>General Chemistry I Lab</td>
</tr>
<tr>
<td>ENGR 101</td>
<td>Introduction to Engineering I</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Differential Calculus</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 202</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>CHE 205</td>
<td>General Chemistry II Lab</td>
</tr>
<tr>
<td>ENGR 102</td>
<td>Introduction to Engineering II</td>
</tr>
<tr>
<td>MATH 252</td>
<td>Integral Calculus</td>
</tr>
<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
</tr>
<tr>
<td></td>
<td>Social Science Elective</td>
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<tr>
<td><strong>Total</strong></td>
<td>16</td>
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</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO 201</td>
<td>Principles of Economics,</td>
</tr>
<tr>
<td></td>
<td>Microeconomics</td>
</tr>
<tr>
<td>Or</td>
<td>Principles of Economics,</td>
</tr>
<tr>
<td></td>
<td>Macroeconomics</td>
</tr>
<tr>
<td>EE 221</td>
<td>Circuits I</td>
</tr>
<tr>
<td>MATH 321</td>
<td>Applied Differential Equations</td>
</tr>
<tr>
<td>PHY 221</td>
<td>General Physics with Calculus</td>
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<td><strong>Total</strong></td>
<td>15</td>
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</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 223</td>
<td>Circuits II</td>
</tr>
<tr>
<td>ENGR 211</td>
<td>Engineering Mechanics: Statics</td>
</tr>
<tr>
<td>HIST 356</td>
<td>A History of Energy</td>
</tr>
<tr>
<td>Or</td>
<td>History of Electrical Grid</td>
</tr>
<tr>
<td>PHY 222</td>
<td>General Physics with Calculus</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
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</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 225</td>
<td>Circuits III</td>
</tr>
<tr>
<td>MATH 361</td>
<td>Statistical Methods I</td>
</tr>
<tr>
<td>Or</td>
<td>MATH 465 Mathematical Statistics</td>
</tr>
<tr>
<td>PHY 223</td>
<td>General Physics with Calculus</td>
</tr>
<tr>
<td>REE 243</td>
<td>Electrical Power</td>
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</table>

### Junior Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>EE 321</td>
<td>Electronics I</td>
</tr>
<tr>
<td>MATH 341</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MECH 318</td>
<td>Fluid Mechanics I</td>
</tr>
<tr>
<td>ENGR 318</td>
<td>Engineering Mechanics: Fluids</td>
</tr>
<tr>
<td>REE 253</td>
<td>Electromechanical Energy Conversion</td>
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#### Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>CHE 307</td>
<td>Materials for RE Applications</td>
</tr>
<tr>
<td>EE 343</td>
<td>Solid-State Electronic Devices</td>
</tr>
<tr>
<td>EE 355</td>
<td>Control Systems Design</td>
</tr>
<tr>
<td>ENGR 355</td>
<td>Thermodynamics</td>
</tr>
<tr>
<td>WRI 125</td>
<td>Technical Report Writing</td>
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### Senior Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 465</td>
<td>Capstone Project</td>
</tr>
<tr>
<td>REE 4XX</td>
<td>Senior Sequence I</td>
</tr>
<tr>
<td>REE 412</td>
<td>Photovoltaic Systems</td>
</tr>
<tr>
<td>REE 463</td>
<td>Renewable Energy Engineering Elective</td>
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#### Winter

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ENGR 465</td>
<td>Capstone Project</td>
</tr>
<tr>
<td>REE 4XX</td>
<td>Senior Sequence II</td>
</tr>
<tr>
<td>REE 463</td>
<td>Energy Systems Instrumentation</td>
</tr>
<tr>
<td>REE 465</td>
<td>Renewable Energy Engineering Elective</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

### Total Credits Required for B.S. in Renewable Energy Engineering: 185

*CHE201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively.

*With advisor approval students may take REE 201 in place of ENGR 101 and ENGR 102.

**Choose from WRI327, WRI350, and WRI410.
Curriculum – Wilsonville Campus

Required courses and recommended terms during which they should be taken:

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHE 201 General Chemistry I</td>
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<tr>
<td>CHE 204 General Chemistry I Laboratory</td>
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<tr>
<td>REE 201 Introduction to Renewable Energy</td>
<td>Fall</td>
<td>4</td>
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<tr>
<td>MATH 251 Differential Calculus</td>
<td>Fall</td>
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<td>WRI 121 English Composition</td>
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<td><strong>Total</strong></td>
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Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Winter</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHE 202 General Chemistry II</td>
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<tr>
<td>CHE 205 General Chemistry II Laboratory</td>
<td>Winter</td>
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<tr>
<td>ECO 201 Principles of Economics, Microeconomics</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>MATH 252 Integral Calculus</td>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>WRI 122 Argumentative Writing</td>
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Sophomore Year

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EE 221 Circuits I</td>
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<td>4</td>
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<tr>
<td>MATH 361 Statistical Methods I</td>
<td>Fall</td>
<td>4</td>
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<tr>
<td>SPE 111 Public Speaking</td>
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<td>WRI 227 Technical Report Writing</td>
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<tr>
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Sophomore Year

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EE 223 Circuits II</td>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 267 Engineering Programming</td>
<td>Winter</td>
<td>3</td>
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<tr>
<td>MATH 341 Linear Algebra</td>
<td>Winter</td>
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<tr>
<td>PHY 222 General Physics with Calculus</td>
<td>Winter</td>
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Sophomore Year

<table>
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<tr>
<th>Course</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>EE 225 Circuits III</td>
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<td>4</td>
</tr>
<tr>
<td>MATH 321 Applied Differential Equations I</td>
<td>Spring</td>
<td>4</td>
</tr>
<tr>
<td>PHY 223 General Physics with Calculus</td>
<td>Spring</td>
<td>4</td>
</tr>
<tr>
<td>REE 243 Electrical Power</td>
<td>Spring</td>
<td>4</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>Spring</strong></td>
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Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EE 321 Electronics I</td>
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<tr>
<td>ENGR 211 Engineering Mechanics: Statics</td>
<td>Fall</td>
<td>4</td>
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<tr>
<td>ENGR 355 Thermodynamics</td>
<td>Fall</td>
<td>3</td>
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<tr>
<td>REE 337 Materials for RE Applications</td>
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<td>3</td>
</tr>
<tr>
<td>Or</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>EE 343 Solid-State Electronics Devices</td>
<td>Fall</td>
<td>3</td>
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<tr>
<td>SPE 321 Small Group &amp; Team Comm.</td>
<td>Fall</td>
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<td><strong>Total</strong></td>
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Junior Year

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<tr>
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<tbody>
<tr>
<td>HIST 356 A History of Energy</td>
<td>Winter</td>
<td>3</td>
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<tr>
<td>Or</td>
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<td>3</td>
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<tr>
<td>HIST 357 History of Electrical Grid</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>MECH 318 Fluid Mechanics I</td>
<td>Winter</td>
<td>4</td>
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<tr>
<td>Or</td>
<td>Winter</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 318 Engineering Mechanics: Fluids</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>REE 412 Photovoltaic Systems</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>REE 463 Energy Systems Instrumentation</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>Humanities Elective</td>
<td>Winter</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>Winter</strong></td>
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Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Spring</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EE 355 Control Systems Design</td>
<td>Spring</td>
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<tr>
<td>ENGR 465 Capstone Project</td>
<td>Spring</td>
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<tr>
<td>MECH 323 Heat Transfer I</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>REE 253 Electromechanical Energy Conversion</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>Renewable Energy Engineering Elective</td>
<td>Spring</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>Spring</strong></td>
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Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Credits</th>
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<tbody>
<tr>
<td>REE 331 Fuel Cells</td>
<td>Fall</td>
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</tr>
<tr>
<td>REE 4XX Senior Sequence I</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>Renewable Energy Engineering Elective</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>Renewable Energy Engineering Elective</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>Social Science Elective</td>
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Senior Year

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EE 419 Power Electronics</td>
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<tr>
<td>ENGR 465 Capstone Project</td>
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</tr>
<tr>
<td>REE 4XX Senior Sequence II</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>Renewable Energy Engineering Elective</td>
<td>Winter</td>
<td>3</td>
</tr>
<tr>
<td>Humanities Elective</td>
<td>Winter</td>
<td>3</td>
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<td><strong>Total</strong></td>
<td><strong>Winter</strong></td>
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Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Spring</th>
<th>Credits</th>
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<tr>
<td>ENGR 465 Capstone Project</td>
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<tr>
<td>REE 4XX Senior Sequence III</td>
<td>Spring</td>
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<tr>
<td>REE 413 Electric Power Conversion Systems</td>
<td>Spring</td>
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<tr>
<td>Renewable Energy Engineering Elective</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>Humanities Elective</td>
<td>Spring</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Spring</strong></td>
<td><strong>15</strong></td>
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</tbody>
</table>

Total Credits Required for B.S. in Renewable Energy Engineering: 184

Renewable Energy Engineering Electives

Students in the BSREE program are required to complete 15 credits of technical electives classes. At least 3 of these classes must be 300-level or above and up to two courses from the following list: 300- or 400-level EE courses (except for EE320, ENGR42X, or EME42X). No more than three 1-credit courses are allowed. Enrollment in graduate-level courses at the undergraduate level requires special approval. Examples of acceptable elective courses are:

- EE 341 Electricity and Magnetism with Transmission Lines
- EE 347 Digital Logic
- EE 433 Solid State Devices
- MECH 433 HVAC
- REE 331 Fuel Cells
- REE 333 Batteries
- REE 335 Hydrogen
- REE 337 Materials for RE Applications
- REE 344 Nuclear Energy
- REE 345 Wind Power
- REE 346 Biofuels and Biomass
- REE 347 Hydroelectric Power
- REE 348 Solar Thermal Energy Systems
- REE 380/480 Independent Study/Special Topics/Seminar
- REE 427 Greenhouse Gas Accounting
- REE 439 Building Energy Auditing and Management
- REE 451 Geothermal Energy and Direct Use Applications
- REE 453 Power Systems Analysis
- REE 454 Power System Protection/Control
- REE 455 Efficient Building Design
- REE 465 Transportation Systems
- REE 469 Grid Integration of RE

Note: Course may be repeated multiple times for credit with approval.

Senior Sequences:

Students are required to complete a minimum of one sequence (all three courses) from the list below:

- Green Building: MECH 433, REE 439 and REE 455
- Power Systems: REE 453, REE 454 and REE 469
- Geothermal: REE 431, REE 451 and REE 471

With approval, students can complete a graduate-level REE sequence to meet the senior sequence requirement. Enrollment in graduate-level courses at the undergraduate level requires special approval.
Bachelor of Science in Renewable Energy Engineering with a Dual Major

Students completing the BSREE program have the option of selecting a dual major. The EERE department currently offers a dual major in Optical Engineering, and a dual major in Systems Engineering & Technical Management. Students completing a BSREE degree with a dual major will receive a single BS degree with both majors listed on their diploma and transcript. The degree is issued upon completion of the requirements for each major (some courses may be used to meet the requirements for both majors). The requirements for the dual major in Optical Engineering, as well as the dual major in Systems Engineering & Technical Management are listed under the corresponding sections of the catalog.

Concurrent Degree in Renewable Energy Engineering and Electrical Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees: a BS in Renewable Energy Engineering and a BS in Electrical Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high-growth discipline (Renewable Energy Engineering). The degree program will take an additional year beyond the BSREE degree program (or 4.5 years total by taking courses in Summer term). To obtain both degrees (BSREE and BSEE) students must complete all of the courses required for the BSREE degree and the following BSEE courses. Consult with your advisor for details.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CST 116</td>
<td>C++ Programming</td>
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</tr>
<tr>
<td>EE 332</td>
<td>Electronics II</td>
<td>5</td>
</tr>
<tr>
<td>EE 331</td>
<td>Digital System Design w/HDL</td>
<td>4</td>
</tr>
<tr>
<td>EE 333</td>
<td>Microcontroller Engineering**</td>
<td>4</td>
</tr>
<tr>
<td>EE 341</td>
<td>Electricity and Magnetism with Transmission Lines**</td>
<td>4</td>
</tr>
<tr>
<td>EE 343</td>
<td>Solid State Electronic Devices*</td>
<td>3</td>
</tr>
<tr>
<td>EE 347</td>
<td>Digital Logic***</td>
<td>4</td>
</tr>
<tr>
<td>EE 430</td>
<td>Linear Systems &amp; DSP</td>
<td>5</td>
</tr>
<tr>
<td>EE 335</td>
<td>Advanced Microcontroller Engineering 4</td>
<td>4</td>
</tr>
<tr>
<td>MATH 253N</td>
<td>Sequences and Series</td>
<td>4</td>
</tr>
<tr>
<td>MATH 465</td>
<td>Mathematical Statistics*</td>
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<tr>
<td>MGT 345</td>
<td>Engineering Economy</td>
<td>3</td>
</tr>
</tbody>
</table>

Students must complete a minimum of 36 credit hours in addition to the BSREE degree requirements in order to get a dual degree.

Concurrent Degree in Renewable Energy Engineering and Environmental Sciences

Renewable Energy Engineering students have the opportunity to earn a dual degree: a BS in Renewable Energy Engineering and a BS in Environmental Sciences. The additional degree requires 54 credits in Environmental Sciences courses, which can be taken concurrent to Renewable Energy Engineering courses or in an add-on year. A second degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Renewable Energy Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Renewable Energy Engineering.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIO 111</td>
<td>Introduction to Environmental Sciences</td>
<td>4</td>
</tr>
<tr>
<td>BIO 211</td>
<td>Principles of Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIO 212</td>
<td>Principles of Biology</td>
<td>4</td>
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<tr>
<td>BIO 213</td>
<td>Principles of Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIO 327</td>
<td>General Ecology</td>
<td>4</td>
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<tr>
<td>BIO 434</td>
<td>Data Analysis Methods</td>
<td>3</td>
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<tr>
<td>MATH 361</td>
<td>Statistical Methods II</td>
<td>4</td>
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<tr>
<td>MATH 362</td>
<td>Statistical Methods II</td>
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<tr>
<td>CHE 223</td>
<td>General Chemistry III</td>
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<tr>
<td>CHE 331</td>
<td>Organic Chemistry I</td>
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<tr>
<td>ENV 314</td>
<td>Environmental Management and Restoration</td>
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<tr>
<td>GEOG 105</td>
<td>Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>GIS 134</td>
<td>Geographic Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

4+1 BSREE/MSREE Program

Students may earn both BSREE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSREE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework. Students pursuing this option follow the standard BSREE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSREE requirements:
- Replace 9 credits of REE senior sequence with one graduate-level REE sequence.
- Replace 3 terms of ENGR465 - Capstone Project with 3 terms of Graduate Design Project (REE 599, 599, 599).

To meet additional MSREE requirements:
- Research Methods and Innovation sequence (REE 511, 512, 513)
- Energy Engineering sequence (REE 515, 516, 517)
- Graduate-level REE specialization sequence (REE 5xx, 5xx, 5xx)
- Graduate-level REE specialization sequence (REE 5yy, 5yy, 5yy)

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSREE and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by an REE advisor. Students should contact their academic advisors for details.

* This technical emphasis elective must have a CHE prefix; different courses are offered every year.
The Master of Science in Renewable Energy Engineering (MSREE)

The Master of Science in Renewable Energy Engineering (MSREE) program is offered at Oregon Tech Wilsonville campus. The MSREE program accommodates both full-time students and working professionals. The program is designed to prepare graduates to be energy engineering professionals who have advanced knowledge and skills that enable them to assume a broad range of technical leadership roles.

The MSREE curriculum is built upon core tracks in research methods & innovation and advanced energy engineering. These courses provide the foundation for three required specialized course sequences in renewable energy technologies and nine credits of thesis or graduate R&D project work.

Student Preparation

Students should be prepared to start graduate academic work. Typically, this means the successful new student has the following:

1. A baccalaureate degree in engineering, the physical sciences (e.g., physics, chemistry), or a related technical discipline
2. Evidence of potential for graduate academic work, success or potential for success in industry, and demonstrated interest in energy engineering

Accreditation

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

Master of Science Degree Requirements

The Master of Science in Renewable Energy Engineering is a rigorous curriculum that requires 54 credit hours and approximately two years to complete.

Curriculum

Required courses and recommended terms during which they should be taken:

**First Year**

<table>
<thead>
<tr>
<th>Course 1 of 3</th>
<th>Fall</th>
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<tbody>
<tr>
<td>REE 511 Research Methods &amp; Innovation I</td>
<td>3</td>
</tr>
<tr>
<td>REE 515 Energy Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>REE 5xx REE Specialization Sequence X: Course 1 of 3</td>
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</tr>
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<tr>
<th>Course 2 of 3</th>
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<tr>
<td>REE 512 Research Methods &amp; Innovation II:</td>
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<tr>
<td>REE 516 Energy Engineering II</td>
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<tr>
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<tr>
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<tr>
<td>REE 513 Research Methods &amp; Innovation III:</td>
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<tr>
<td>REE 517 Energy Engineering III</td>
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**Second Year**

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<tr>
<td>REE 599 Graduate Research or Project</td>
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<tr>
<td>REE 5yy REE Specialization Sequence Y: Course 1 of 3</td>
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<table>
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<tr>
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<tr>
<td>REE 599 Graduate Research or Project</td>
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<tr>
<td>REE 5yy REE Specialization Sequence Y: Course 2 of 3</td>
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<th>Course 3 of 3</th>
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<tbody>
<tr>
<td>REE 599 Graduate Research or Project</td>
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<tr>
<td>REE 5yy REE Specialization Sequence Y: Course 3 of 3</td>
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**Total Credits Required for M.S. in Renewable Energy Engineering**: 54

Renewable Energy Specialization Sequences

Students must complete three REE specialization sequences from the list below. Other sequences may be used to satisfy this requirement with advisor and department chair approval. One of the sequences may be replaced with three approved elective courses. Not all sequences are offered every year.

Biofuels and Biomass

- RREE 521 Production of Biomass and Biofuels | 3 |
- RREE 541 Utilization strategies of Bioenergy | 3 |
- RREE 561 Process and Economic Eval. for Biomass Systems | 3 |

Electrochemical Systems

- RREE 523 Hydrogen Production and Storage | 3 |
- RREE 543 Materials for Electrochemical Processes | 3 |
- RREE 563 Batteries | 3 |

Photovoltaic Systems and Processes

- RREE 525 Solid-State Physics of Photovoltaic Materials | 3 |
- RREE 545 Applied Photovoltaics | 3 |
- RREE 565 Semiconductor Process Engineering | 3 |

Wind Power Systems and Integration

- RREE 527 Wind Power Generators | 3 |
- RREE 547 Electric Power Conversion | 3 |
- RREE 567 Wind Energy Systems Integration | 3 |

Electrical Power Systems

- RREE 529 Power Systems Analysis | 3 |
- RREE 549 Power System Protection and Control | 3 |
- RREE 569 Grid Integration of Renewables | 3 |

Geothermal Energy

- RREE 531 Ground-Source Heat Pumps | 3 |
- RREE 551 Advanced Geothermal Energy | 3 |
- RREE 571 Geothermal Power Generation | 3 |

Energy Efficient Building Systems

- RREE 533 Heating, Ventilation, and Air Conditioning | 3 |
- RREE 553 Energy Systems Management and Auditing | 3 |
- RREE 573 Energy-Efficient Building Design | 3 |

Fuel Cell Systems

- RREE 535 Fuel Cell Fundamentals | 3 |
- RREE 555 Stationary Fuel Cells | 3 |
- RREE 575 Transportation Fuel Cells | 3 |
Global Energy Issues
REE 537 Sustainability of Energy Systems 3
REE 557 Costing Renewable Energy 3
REE 577 Renewable Energy Integration 3

Hydro Power Systems and Integration
REE 539 Hydraulics and Fluid Mech. Of Hydro-power 3
REE 559 Development of Hydropower Projects 3
REE 579 Economic, Regulatory, and Environmental Aspects of Hydropower 3

Energy Storage
REE 581 Energy storage Fundamentals 3
REE 582 Introduction to Batteries 3
REE 583 Introduction to Fuel Cells 3

Advanced Energy Storage
REE 591 Hydrogen Storage and Production 3
REE 592 Advanced Batteries 3
REE 593 Advanced Fuel Cells 3
Automation, Robotics, and Controls Engineering

Degree Offered
Automation, Robotics, and Controls Engineering (Dual major)

The major in Automation, Robotics, and Controls Engineering is designed as a dual major option for students with an ABET accredited primary major in an engineering discipline offered at Oregon Tech. Students first choose a primary ABET accredited major (e.g., Electrical Engineering, Renewable Energy Engineering, Mechanical Engineering), and complete additional specialized coursework to earn a second major in Automation, Robotics, and Controls Engineering. The program is designed so that both majors in the degree can be completed in 4 years by taking summer courses. ABET ETAC degree students may also pursue the dual major with departmental approval.

Career Opportunities
Automation, Robotics, and Control is a multidisciplinary engineering field concerned with the design, modeling, analysis, and control of predominantly computer-based automated systems or processes. Automated systems typically contain a mixture of equipment, devices, software, hardware, and humans. The discipline requires knowledge of elements of electrical engineering, mechanical engineering, chemical engineering, software programming, communications systems, and human factors engineering. The dual major curriculum provides students with design techniques that emphasize automation system integration, and contains subject matter and tools for modeling, analysis, and design including measurement and control system theory, modeling and simulation, hardware and programming, as well as systems engineering. Due to the multidisciplinary nature of their background, graduates of the program have the necessary skills to design or manage systems resulting from the integration of diverse components and technologies. Engineers working in this field design solutions to address problems in areas such as factory automation, building automation, process control, and motion control and robotics.

Student Preparation
Students interested in the Automation, Robotics, and Controls Engineering dual major should contact the Automation, Robotics, and Controls Engineering program director for an advising appointment early in their primary major programs to ensure timely completion of both majors.

Accreditation
Completion of a dual major in Automation, Robotics, and Controls Engineering is contingent upon finishing a primary major in an ABET accredited program.

Degree Requirements
A dual major in Automation, Robotics, and Controls Engineering requires 92 credits in automation and other engineering coursework. Many of these course credits may be used to meet requirements in the primary major; depending upon selection of primary major it is estimated that only 28-36 additional credits will be needed beyond the primary major requirements. The capstone project required in the student’s primary major is expected to incorporate elements from both the primary and the Automation, Robotics, and Controls Engineering majors. Since the required courses for Automation, Robotics, and Controls Engineering must be taken along with those for the primary major, a full curriculum map is not provided. Students should carefully plan each term in consultation with their primary major advisor and with their Automation, Robotics, and Controls Engineering advisor. To obtain a dual major in Automation, Robotics, and Controls Engineering, students must complete the courses required for the Bachelor of Science degree in their primary engineering major as well as the following list of specialized Automation, Robotics, and Controls Engineering courses:

Automation, Robotics, and Controls Engineering Major Core (31 cr)
REE 463 (2-3-3) Energy System Instrumentation
EE 355 (3-3-4) Control Systems Design
ENGR 420 (3-3-4) Engineering Modeling
ENGR 421 (3-3-4) Automation Systems
ENGR 422 (3-3-4) Process Control
ENGR 423 (3-3-4) Motion Control and Robotics

Electrical Engineering and Computer Science Requirements (36 cr)
EE 131 (3-3-4) Digital Electronics I
EE 133 (3-3-4) Digital Electronics II
EE 221 (3-3-4) Circuits I
EE 223 (3-3-4) Circuits II
EE 225 (3-3-4) Circuits III
EE 333 (3-3-4) Microcontroller Engineering
EE 430 (4-3-5) Linear Systems and DSP
CST 116 (3-3-4) C++ Programming
ENGR 267 (2-3-3) Engineering Programming

Supporting Engineering Requirements (25 cr)
REE 245 (3-3-4) Electric Power
REE 253 (3-3-4) Electromechanical Energy Conversion
ENGR 211 (4-0-4) Engineering Mechanics: Statics
ENGR 212 (3-0-3) Engineering Mechanics: Dynamics
ENGR 355 (3-0-3) Thermodynamics
MECH 318 (3-3-4) Fluid Mechanics I
MECH 323 (3-0-3) Heat Transfer I
SE 421 (4-0-4) Systems Engineering
SE 422 (4-0-4) Advanced Systems Engineering

Total: 92 credits (Note: many courses may be part of the primary major).
Optical Engineering

Degree Offered
Optical Engineering (Dual major)

The major in Optical Engineering is designed as a dual major degree option for students with an ABET-accredited primary major in an engineering discipline offered at Oregon Tech (e.g., Electrical Engineering, Mechanical Engineering). Students choose a primary ABET accredited engineering major and complete the additional specialized coursework to earn a second major in Optical Engineering. The Optical Engineering dual major is offered at the Wilsonville campus.

Program Objectives
Graduates of the Optical Engineering program will:

1. Have a strong technical background in addition to the analytical, critical-thinking, and problem-solving skills needed as engineering and science professionals.
2. Be employed as optical engineers, optomechanical engineers, optoelectronics engineers, laser engineers, and similar positions in the engineering industry.
3. Understand the value of and show a commitment to professional development and lifelong learning.
4. Be effective team members with excellent oral and written communication skills, which lead to technical and managerial leadership roles.

Career Opportunities
Optical Engineering is the branch of engineering that incorporates the production, modification, and detection of light into devices and processes. Graduates of the Optical Engineering program are employed as optical engineers, illumination engineers, metrology engineers, optomechanical engineers, optoelectronics engineers, laser engineers, and similar positions in the engineering industry. A dual major in Optical Engineering provides students with the opportunity to combine engineering disciplines. This provides a competitive advantage for graduates entering the workforce because optical subsystems are now common in many engineering applications. For example, a student seeking to become an optomechanical engineer might combine with mechanical engineering; an optoelectronics engineer would combine with electrical engineering; a solar energy engineer with renewable energy engineering.

Employers of Optical Engineering graduates include more than eighty Oregon companies that encompass a diverse range of applications. These include semiconductor inspection, infrared imaging, automation, surface coatings, laser manufacture, lighting, camera design, optical fiber communication, and colorimetry.

Student Preparation
Students considering the Optical Engineering major must first select a primary engineering major and complete the freshman engineering coursework including calculus and calculus-based physics. Upon completion of the freshman primary major requirements, students interested in the Optical Engineering dual major should contact the Optical Engineering program director for an advising appointment. Students entering the Optical Engineering program by transfer are requested to contact their primary major department concerning transfer of technical coursework. Completing a year of calculus-based physics is mandatory before any optical engineering classes can be taken.

Accreditation
Completion of a dual major in Optical Engineering is contingent upon finishing a primary major in an ABET accredited program.

Degree Requirements
A dual major in Optical Engineering requires 40 specialized credits in optics and electrical engineering. Some of these courses may be used to meet requirements in the primary major also. The capstone project required in the student’s primary major is expected to incorporate elements from both the primary and optical engineering majors. Since the required courses for Optical Engineering must be taken along with those for the primary major, a full curriculum map is not provided. Students should carefully plan each term in consultation with their primary major advisor and with their Optical Engineering advisor. To obtain a dual major in optical engineering, students must complete the courses required for the Bachelor of Science degree in their primary engineering major as well as the following list of specialized Optical Engineering courses:

- EE 221 Circuits I 4
- EE 223 Circuits II 4
- EE 225 Circuits III 4
- EE 343 Solid-State Devices 4
- EE/PHY 448 Geometric Optics 4
- EE/PHY 449 Radiometry & Optical Detection 4
- EE/PHY 450 Physical Optics 4
- EE/PHY 451 Lasers 4
- EE/PHY 452 Fiber Optics 4
- EE/PHY 453 Optical Metrology 4
Systems Engineering & Technical Management

Degree Offered
Systems Engineering & Technical Management (Dual major)

The major in Systems Engineering & Technical Management is designed as a dual major option for students with an ABET accredited primary major in an engineering discipline offered at Oregon Tech. Students first choose a primary ABET accredited major (e.g., Electrical Engineering, Renewable Energy Engineering, Mechanical Engineering, Civil Engineering), and complete additional specialized coursework to earn a second major in Systems Engineering & Technology Management. The program is designed so that both majors in the degree can be completed in 4 years by taking summer courses. ABET ETAC degree students may also pursue the dual major with departmental approval.

Career Opportunities
Systems engineers address complex problems in areas such as electrical & electronic systems, information systems, renewable energy systems, economic and financial systems, telecommunications, transportation, project management, and manufacturing. Systems engineering is not about specific technologies, but how to put heterogeneous technologies together to formulate system solutions to complex problems. As such, systems engineering is a multidisciplinary engineering discipline concerned with the design, modeling, analysis, and management of technological systems that employ a combination of devices, software, hardware, firmware, materials, and humans for such diverse purposes as communications, energy engineering, health care, transportation or manufacturing. The dual major curriculum provides engineering students with design viewpoints and methodologies that emphasize system integration, and with subject matter and tools for modeling and analysis especially appropriate for large complex systems including system theory, simulation, computational data analysis and statistics, and engineering management. This dual major is designed to address the need for both systems engineering and T-shape individuals at the BS level. After 4 years, graduates of the dual degree program are technically competent in an engineering discipline and ready to enter the workforce as functional engineers but also have formal education, training and skills in systems engineering, project management, product development, strategy and innovation, and engineering management to assume functional managerial positions, such as project managers and technical team leaders.

Student Preparation
Students considering the dual major in Systems Engineering & Technical Management must first select a primary engineering major and complete the freshman engineering coursework including calculus and calculus-based physics. Upon completion of the freshman primary major requirements, students interested in the Systems Engineering & Technical Management dual major should contact the department chair for an advising appointment. Students who are planning to complete this dual major are encouraged to contact the department chair upon completion of the freshman year.

Accreditation
Completion of a dual major in Systems Engineering & Technical Management is contingent upon finishing a primary major in an ABET accredited program.

Degree Requirements
To obtain a dual major in Systems Engineering & Technical Management, students must complete the courses required for the Bachelor of Science degree in their primary engineering major, as well as the dual major requirements listed below. Some of these courses may be used to meet requirements in the primary major also.

SE Major Core Requirements (12 cr)
SEM 421 Systems Engineering 4
SEM 422 Advanced Systems Engineering 4
SEM 425 Advanced Management for Engineers 4

Mathematics Requirements (12 cr)
MATH 321 Applied Differential Equations I 4
MATH 341 Linear Algebra I 4
MATH 465 Mathematical Statistics 4
or MATH 362 Statistical Methods II 4

Systems Electives (9 cr)
[Select 9 cr from the following electives or advisor approved Elective courses]
EE 355 Control Systems Design 4
EE 430 Linear Systems & Digital Signal Processing 5
EE 432 Advanced Digital System Design with HDL 4
Geomatics Department

Jack Walker, Department Chair
Professors: J. Ritter, J. Walker
Associate Professor: M. Marker
Wilsonville Program Director: T. Kent

Degree Offered
Bachelor of Science in Geomatics with options in:
Surveying
Geographic Information Systems

Minors Offered
Geographic Information Systems
Surveying

Geomatics is the modern surveying, engineering, geoscience, and IT-related discipline which employs an integrated approach to the measurement, mathematical modeling, and management of spatial data. Spatial data is obtained from a variety of sources including ground-based instruments, mobile mapping technologies, aerial imaging, hydrographic, and earth-orbiting satellite systems. Spatial data is used to create a detailed but understandable picture of the Earth's physical features. This data enables the design and development of land administration systems for sustainable planning and management of the built environment.

Geomatics provides the opportunity to work primarily outdoors, exclusively in an office, or in some combination of the two. Geomatics attracts individuals who enjoy working outdoors, as well as those who enjoy working indoors with computers, advanced technology, and high-tech instruments. Career employment is available in rural and urban areas.

Students within the Geomatics Program must choose between either an option in Surveying or Geographic Information Systems (GIS). Students may, with consent of their advisor, complete both options.

Program Objectives
Graduates of the Oregon Tech Geomatics options will:
1. Acquire the ability to obtain professional licensure and/or certifications in the geospatial industry.
2. Advance in the geospatial industry during their career by becoming involved in local, state, national, or international professional organizations.
3. Obtain industry positions requiring increased responsibility.
4. Assume responsibility for lifelong learning in professional and personal development.
5. Demonstrate readiness for graduate education and/or advanced technical education.

Student Preparation
It is recommended that students prepare for entrance into the program by emphasizing mathematics and science in high school. Two years of algebra and one year each of geometry, trigonometry and physics are desirable prerequisites.

Degree Requirements
A minimum of 180 term hours must be completed for the Surveying option, of which 80 term hours must be in the GIS and geomatics area. A minimum of 180 term hours must be completed for the GIS option, of which 74 term hours must be in the GIS and geomatics area.

Bachelor of Science in Geomatics, Surveying Option
The department offers a nationally-recognized professional degree program that prepares students for employment within the geomatics profession and licensure as a Professional Land Surveyor (PLS). Students enjoy small classes taught by licensed professionals that emphasize fundamental theory and problem solving in a computer-intensive curriculum. Field laboratory experiences integrated throughout the curriculum provide practical skills, and offer extensive opportunities to prepare students to work in teams using state-of-the-art technology. Upon completing the freshman year, students often have sufficient experience to obtain summer employment as a survey crew member.

Completion of the program qualifies graduates to take the Fundamentals of Surveying (FS) exam during the spring term of the senior year. The broad-based nature of the curriculum ensures that graduates will be prepared to fulfill both the traditional and contemporary roles of the profession.

Cooperative Education
Geomatics students may, upon completion of the freshman year, apply for student career experience programs (Pathways) with the U.S. Bureau of Land Management, Bonneville Power Administration, U.S. Forest Service, or other appropriate federalemployers. Work experiences are paid and may be for three or six month periods. Students may earn two or four credits for work experience periods. A maximum of four credits may be applied toward the bachelor’s degree.

Geomatics students are also eligible for the Civil Engineering Cooperative Program (CE-COP), offering high-quality, paid industrial experience and related academic activities while students pursue their degree. The Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) counts this internship time toward PLS licensure requirements.

Scholarships
Approximately 40 scholarships are available to geomatics students each year through an endowed Geomatics Department Scholarship, CLSA, PLSO, LSAW, WESTFED, NSPS, and other organizations.

Career Opportunities
The employment forecast for graduates in this field is exceptional. As an increasing number of licensed surveyors across the nation retire, a personnel shortage has been created within the geomatics profession. Graduates are prepared for a wide variety of career opportunities in the fields of surveying, engineering, construction, remote sensing, GIS, and land information management.

Accreditation
The Geomatics Program (surveying option) is accredited by the Applied Science Accreditation Commission (ASAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.
Bachelor of Science in Geomatics, Surveying Option

Curriculum

Required courses and recommended terms during which they should be taken:

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<thead>
<tr>
<th>Freshman Year Fall</th>
<th>Junior Year Winter</th>
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<tbody>
<tr>
<td>WRI 103 The Digital Earth</td>
<td>GIS 316 Geospatial Vector Analysis I</td>
</tr>
<tr>
<td>GME 161 Plane Surveying I</td>
<td>GME 466 Boundary Law II</td>
</tr>
<tr>
<td>MATH 112 Trigonometry</td>
<td>SPE 321 Small Group and Team Communication</td>
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<tr>
<td>WRI 121 English Composition</td>
<td>ENV/GIS/GME Elective</td>
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<tr>
<th>Freshman Year Winter</th>
<th>Senior Year Fall</th>
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<tbody>
<tr>
<td>CE 203 Engineering Graphics</td>
<td>BUS 226 Business Law</td>
</tr>
<tr>
<td>GIS 134 Geographic Information Systems</td>
<td>GME 351 Construction and Engineering Surveying</td>
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<tr>
<td>GME 175 Computations and Platting</td>
<td>GME 444 Adjustment by Least Squares</td>
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<tr>
<td>MATH 251 Differential Calculus</td>
<td>MGT 345 Engineering Economy</td>
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<tr>
<td>WRI 122 Argumentative Writing</td>
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<tr>
<td>GME 163 Route Surveying</td>
<td>BUS 304 Engineering Management</td>
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<tr>
<td>GME 241 Boundary Law I</td>
<td>GME 425 Remote Sensing</td>
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<tr>
<td>MATH 252 Vector Calculus I</td>
<td>GME 451 Geodesy</td>
</tr>
<tr>
<td>PHY 221 General Physics with Calculus</td>
<td>MIS 118 Programming Fundamentals</td>
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<th>Junior Year Spring</th>
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<tbody>
<tr>
<td>GME 242 Land Descriptions and Cadastre</td>
<td>GME 468 Geomatics Practicum</td>
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<tr>
<td>GME 264 Digital Design for Surveying</td>
<td>Business Elective</td>
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<tr>
<td>PHY 222 General Physics with Calculus</td>
<td>Humanities Elective</td>
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<tr>
<td>WRI 227 Technical Report Writing</td>
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<td>Social Science Elective</td>
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<th>Sophomore Year Spring</th>
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<tbody>
<tr>
<td>GME 372 Subdivision Planning and Platting</td>
<td>GME 468 Geomatics Practicum</td>
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<tr>
<td>MATH 361 Statistical Methods I</td>
<td>Business Elective</td>
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<tr>
<td>PHY 223 General Physics with Calculus</td>
<td>Humanities Elective</td>
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<td>Total 14</td>
<td>Science Elective **</td>
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<table>
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<th>Junior Year Fall</th>
<th>Total credits required for B.S. in Geomatics, Surveying Option: 180</th>
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<tbody>
<tr>
<td>GIS 306 Geospatial Raster Analysis</td>
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<tr>
<td>GME 343 Boundary Surveys</td>
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</tr>
<tr>
<td>MIS 113 Introductions to Database Systems</td>
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<tr>
<td>WRI 327 Advanced Technical Writing</td>
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<tr>
<td>Social Science Elective</td>
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* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

** GEOG 201 Physical Geology recommended. Note: Humanities and Social Science Electives must be approved by the department.

Career Opportunities

The list of opportunities for students in the field of GIS has been, and is continuing to show substantial growth. As our society becomes more data centered, the importance of understanding the spatial location of this data and its spatial relationship to other data is becoming increasingly apparent. Understanding such geospatial relationships is fundamental to areas such as health care, land records management, transportation modeling, environmental engineering/science, and urban planning, to name only a few. Local, state, and federal agencies are embracing GIS more each year as these agencies realize that GIS is the appropriate tool to solve long-standing geospatial problems. Private industry is also embracing GIS since it can be used to streamline delivery and/or response routes. Both private and public entities have also realized that GIS provides an excellent decision support framework structure.
Bachelor of Science in Geomatics, Geographic Information Systems (GIS) Option Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year  | Fall          | Winter       |
----------------|---------------|--------------|
GIS 103        | The Digital Earth | 3            |
GME 161        | Plane Surveying I  | 4            |
MATH 111       | College Algebra   | 4            |
WR1 121        | English Composition| 3            |
Total          | 14            | 6            |

Sophomore Year  | Fall          | Winter       |
----------------|---------------|--------------|
CE 203         | Engineering Graphics | 3            |
GIS 134        | Geographic Information Systems | 3            |
GME 175        | Computations and Platting | 3            |
MATH 112       | Trigonometry    | 4            |
SPE 111        | Public Speaking | 3            |
WR1 122        | Argumentative Writing | 3           |
Total          | 16            | 6            |

Sophomore Year  | Fall          | Winter       |
----------------|---------------|--------------|
GIS 205        | GIS Data Integration | 2            |
GME 162        | Plane Surveying II | 4           |
MATH 251       | Differential Calculus | 4             |
SPE 111        | Public Speaking | 3            |
WR1 122        | Argumentative Writing | 3           |
Total          | 15            | 6            |

Sophomore Year  | Fall          | Winter       |
----------------|---------------|--------------|
GIS 306        | Geospatial Raster Analysis | 4            |
GME 241        | Boundary Law I   | 3            |
MATH 252       | Integral Calculus | 4            |
PHY 221        | General Physics with Calculus | 4           |
Total          | 15            | 6            |

Junior Year     | Fall          | Winter       |
----------------|---------------|--------------|
GIS 332        | Customizing the GIS Environment I | 4            |
MIS 218        | Database Programming | 4           |
MIS 341        | Relational Database Design I | 4            |
MATH Elective* | Math Elective* | 3            |
Total          | 15            | 6            |

Junior Year     | Fall          | Winter       |
----------------|---------------|--------------|
BUS 226        | Business Law | 3            |
GIS 432        | Customizing the GIS Environment II | 4           |
MGT 345        | Engineering Economy | 3           |
SPE 111        | Public Speaking | 3           |
WR1 327        | Advanced Technical Writing | 3           |
SPE 111        | Humanities Elective | 3           |
SPE 111        | Social Science Elective | 3           |
Total          | 16            | 6            |

Senior Year     | Fall          | Winter       |
----------------|---------------|--------------|
BUS 304        | Engineering Management | 3           |
GME 425        | Remote Sensing | 4            |
GME 451        | Geodesy       | 4            |
WR1 327        | Advanced Technical Writing | 3           |
SPE 111        | Humanities Elective | 3           |
SPE 111        | Social Science Elective | 3           |
Total          | 17            | 6            |

Senior Year     | Fall          | Winter       |
----------------|---------------|--------------|
GIS 456        | GIS Web Services and Management | 3           |
GME 452        | Map Projections | 3            |
GME 455        | GNSS Surveying for GIS | 4            |
SPE 111        | Humanities Elective | 3           |
SPE 111        | Science Elective | 4            |
Total          | 17            | 6            |

Senior Year     | Fall          | Winter       |
----------------|---------------|--------------|
GME 468        | Geomatics Practicum | 2            |
BUS 356        | Business Elective (upper-division)** | 3           |
SPE 111        | Humanities Elective | 3           |
SPE 111        | Science Elective | 4            |
Total          | 12            | 6            |

* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

** BUS 356 recommended.

Note: Humanities and Social Science Electives must be approved by the department.

Geographic Information Systems Minor

The Geographic Information Systems (GIS) minor is open to all majors and is especially recommended for students majoring in Geomatics (Surveying Option), Environmental Sciences, Business/Management/Information Systems, Computer Science Engineering, Renewable Energy Engineering and Health Care. The minor provides the essential kernel of knowledge and skill necessary to approach geospatial issues pertaining to these disciplines. An advisor in the Geomatics Department must approve any substitution of courses from those listed. Preparation for this course of study entails a functional level of computer literacy that can be evaluated in consultation with an advisor. Students must also have successfully completed MATH 111 prior to enrolling in upper-division classes.

The Minor in Geographic Information Systems (GIS) acknowledges the achievement of 22 credits taken from the following GIS course listing.

Requirements of Minor

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS 103: The Digital Earth</td>
<td>3</td>
</tr>
<tr>
<td>GIS 134: Geographic Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective Courses: 16 credits required

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS 306: Geospatial Raster Analysis</td>
<td>4</td>
</tr>
<tr>
<td>GIS 316: Geospatial Vector Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>GIS 332: Customizing the GIS Environment I</td>
<td>4</td>
</tr>
<tr>
<td>GIS 342: Geospatial Vector Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>GIS 407: GIS Practicum</td>
<td>4</td>
</tr>
<tr>
<td>GIS 426: Geospatial Vector Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>GIS 427: GNSS Surveying for GIS</td>
<td>4</td>
</tr>
<tr>
<td>GIS 466: GIS Database Development</td>
<td>4</td>
</tr>
<tr>
<td>GIS 446: GIS Database Development</td>
<td>4</td>
</tr>
<tr>
<td>MIS 341 or MATH 362 recommended.</td>
<td>3</td>
</tr>
</tbody>
</table>

* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

** BUS 356 recommended.

Note: Humanities and Social Science Electives must be approved by the department.

Total credits required for B.S. in Geomatics, Geographic Information Systems Option: 180
Surveying Minor

The Surveying minor is open to all engineering majors, and is especially recommended for students majoring in Civil Engineering and Geomatics (GIS option). The minor provides the essential knowledge and skills which meet OSBEELS requirements (OAR 820-010-0226) allowing engineering students to sit for the Fundamentals of Surveying (FS) examination, and pursue licensure as a Professional Surveyor (PS). An advisor in the Geomatics Department must approve substitution of courses from those listed.

The Minor in Surveying acknowledges the achievement of 27 credits taken from the following geomatics course listing.

Requirements of Minor

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS 134</td>
<td>Geographic Information Systems¹</td>
<td>3</td>
</tr>
<tr>
<td>GME 162</td>
<td>Plane Surveying</td>
<td>4</td>
</tr>
<tr>
<td>GME 241</td>
<td>Boundary Law</td>
<td>3</td>
</tr>
<tr>
<td>GME 242</td>
<td>Legal Descriptions &amp; Cadastre¹</td>
<td>2</td>
</tr>
<tr>
<td>GME 264</td>
<td>Digital Design for Surveying¹</td>
<td>3</td>
</tr>
<tr>
<td>GME 343</td>
<td>Boundary Surveys</td>
<td>4</td>
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</tbody>
</table>

Elective Courses: 8 credits required

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GME 163</td>
<td>Route Surveying</td>
<td>4</td>
</tr>
<tr>
<td>GME 351</td>
<td>Construction and Engineering Surveying²</td>
<td>3</td>
</tr>
<tr>
<td>GME 372</td>
<td>Subdivision Planning and Platting</td>
<td>3</td>
</tr>
<tr>
<td>GME 425</td>
<td>Remote Sensing¹</td>
<td>4</td>
</tr>
<tr>
<td>GME 444</td>
<td>Adjustment by Least Squares</td>
<td>4</td>
</tr>
<tr>
<td>GME 451</td>
<td>Geodesy¹</td>
<td>4</td>
</tr>
<tr>
<td>GME 452</td>
<td>Map Projections¹</td>
<td>3</td>
</tr>
<tr>
<td>GME 455</td>
<td>GNSS Surveying¹</td>
<td>4</td>
</tr>
<tr>
<td>GME 466</td>
<td>Boundary Law II</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes:
1 CIV 415 will substitute for GME 264.
2 CE 351 will substitute for the GME 163 prerequisite.
3 Required course for GIS majors.
4 MATH 221 will substitute for the GME 175 prerequisite.
Humanities and Social Sciences Department

Mark Neupert, Department Chair
Alishia Huntoon, Program Director, Extern Coordinator and Curriculum Coordinator, Applied Psychology
Maria Lynn Kessler, Applied Psychology

Professors: M. Clark, M. Kessler, M. Neupert
Associate Professor: A. Huntoon,
Assistant Professors: J. Becnel, R. Madden, S. Nathenson

Degrees Offered
Bachelor of Science in:
- Applied Psychology
- Population Health Management

Minors Offered
- Arts, Literature, and Philosophy (ALPs)
- Medical Sociology
- Psychology

Graduate Certificates Offered
Applied Behavior Analysis (ABA)

Module Offered
Oregon Transfer (OTM)

The Humanities and Social Sciences Department offers a wide variety of classes that meet the general education requirements for all students. In addition, these classes meet the lower-division requirements for college transfer students in many pre-professional programs.

Department Goals and Objectives
1. To provide coursework in the humanities and social sciences in order to prepare students for employment in a rapidly changing global market.
2. To provide course offerings in multiculturalism and globalization.
3. To assist students in developing critical thinking and problem-solving abilities and to develop scientific knowledge and inquiry skills.
4. To assist students in developing ethical and cultural awareness.
5. To prepare students to be responsible citizens and lifelong learners.
6. To assist students in developing an aesthetic appreciation of the arts.

ALPs Minor
The ALPs minor may be completed by students from any major and is especially recommended to students who want an opportunity to take a secondary focus in the Humanities during their time at Oregon Tech. This secondary focus will give them an opportunity to further explore their passions in the fields of Arts, Literature, and Philosophy while receiving official recognition of their newly-acquired expertise. The minor will give students the ability to take more Humanities classes that are relevant to their major program and their future career goals while instilling in them the knowledge and values associated with a traditional liberal arts education.

The minor requires 18 credit hours, including one of the required courses listed below (3 credits). The remaining courses must be chosen from the following prefixes: ART, HUM, LIT, PHIL. At least 12 of these 15 credit hours must be upper division courses. Transfer students must take at least 9 hours of their minor credits at Oregon Tech to qualify.

Requirements of the Minor
Required Course (3 credits, one from this set is required, but others can be counted toward electives, below):
HUM 105: Intro to Cultural Studies
HUM 125: Introduction to Technology, Society and Values
HUM 147: Western Culture in the Classical Age (f/k/a Introduction to Humanities I)
HUM 148: Western Culture in the Medieval Age (f/k/a Introduction to Humanities II)
HUM 149: Western Culture in the Modern Age (f/k/a Introduction to Humanities III)
LIT 235: American Multicultural Literature
LIT 253: 20th Century American Literature (f/k/a American Literature I)
LIT 254: 20th Century American Literature (f/k/a American Literature II)
LIT 255: Contemporary American Literature (f/k/a American Literature III)
PHIL 105: Intro to Ethics
PHIL 205: Intro to Logic

Electives (15 credits, at least 12 upper-division):
ART 205: Intro to Watercolors
ART 210: Beginning Sculpture
ART 220: Basic Drawing
ART 226: Digital Photography
ART 280: Introductory Painting
ART 282: Introduction to Acrylic Painting
HUM 105: Intro to Cultural Studies
HUM 125: Introduction to Technology, Society and Values
HUM 147: Western Culture in the Classical Age (f/k/a Introduction to Humanities I)
HUM 148: Western Culture in the Medieval Age (f/k/a Introduction to Humanities II)
HUM 149: Western Culture in the Modern Age (f/k/a Introduction to Humanities III)
HUM 235: Introduction to Film
HUM 245: Digital Diversity
HUM 335: Game Studies
HUM 366: Engineering, Business, and the Holocaust
LIT 104: Introduction to Literature I
LIT 105: Introduction to Literature II
LIT 106: Introduction to Literature III
LIT 225: Contemporary Theater: Ashland Plays
LIT 235: American Multicultural Literature
LIT 246: Creative Writing
LIT 253: 19th Century American Literature (f/k/a American Literature I)
LIT 254: 20th Century American Literature (f/k/a American Literature II)
LIT 255: Contemporary American Literature (f/k/a American Literature III)
LIT 266: Native American Literature and Film
LIT 305: Ecological Issues in Nature Writing
LIT 315: Science Fiction Literature and Film
LIT 325: The Metropolis
LIT 335: Travel Literature: Fiction and Non-Fiction
LIT 345: Post-apocalyptic Literature and Film
LIT 367: Art and Trash in Contemporary Fiction
LIT 373: British Culture and Literature
LIT 381: Contemporary World Literature
LIT 456: Topics in Film
PHIL 105: Intro to Ethics
PHIL 205: Intro to Logic
PHIL 215: Ethical Theory
PHIL 305: Medical Ethics
PHIL 315: Ethics of Emerging Technologies
PHIL 325: Environmental Ethics
PHIL 331: Ethics in the Professions
PHIL 335: Philosophy of Science
PHIL 342: Business Ethics
PHIL 405: Advanced Logic
Medical Sociology Minor
The Department of Humanities and Social Sciences offers a Medical Sociology Minor as a supplement to the Oregon Tech technical and applied degrees related to health, health care, management and social science. The minor offers courses covering the central topics of medical sociology, including the social factors in health and illness, the patient experience of illness, the role of health care professionals, and the interaction between health and society.

The Medical Sociology Minor is designed with the current employer demands and changes in health care organization in mind. Many employers within the health care field seek employees who are culturally competent, prepared to work with diverse populations, and are familiar with social determinants of health.

A minimum of 20 or 21 credits is required to complete the minor. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

Required courses
SOC 204 Introduction to Sociology*
SOC 225 Medical Sociology
SOC 325 Global Population Health
SOC 335 Health Inequality and Cultural Competency

In addition, students will select three courses from the following list. Two of the three courses must be 300 or 400 level.
BIO 200 Medical Terminology
BUS 316 Total Quality in Health Care
COM 225 Interpersonal Communication
COM 345 Organizational Communication
COM 346 Health Communication
HIST 275 History of Medicine
MIS 217 Health Care Systems and Policy
PHIL 335 Medical Ethics
PSY 202 Psychology
PSY 330 Social Psychology
PSY 336 Health Psychology I
PSY 371 Human Sexuality I
PSY 372 Human Sexuality II
SOC 305 Rural Health
STAT 414 Statistical Methods in Epidemiology
SOC or PSY 307/407 will be considered as electives pending program director approval.

*Students are required to take SOC 204 before taking SOC 225.

Psychology Minor
The psychology minor is open to all majors and is especially recommended for students majoring in allied health and medical sciences, management, and communication studies. The minor offers a variety of courses in psychology that can enhance knowledge. A minimum of 24 credits is required to complete the minor. Students should meet with a psychology advisor when choosing electives to fulfill the minor requirements. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

Requirements of the Minor
1. A minimum of 24 credits is required to earn the minor.
2. A minimum of 12 credits must be selected from upper-division coursework. Students must pay strict attention to prerequisite requirements.
3. Courses
   Required lower division courses (9 credits):
   - PSY 201 Psychology
   - PSY 202 Psychology
   - PSY 203 Psychology
   Additional Courses:
   - 12 credits of upper division psychology courses
   - 3 credits of lower or upper division courses
4. For all courses counted toward the Minor in Psychology, a letter grade of “C” or better is required to be awarded the minor.
5. At least 12 credits of courses in this minor must be completed at Oregon Tech.

Note: Not all courses are offered every term or every year.
Applied Psychology

Alishia Huntoon, Program Director, Klamath Falls and Online
MariaLynn Kessler, Program Director, Wilsonville
Alishia Huntoon, Externship Coordinator
Trevor Petersen, Advising Coordinator
Participating Faculty: A. Huntoon, M. Kessler, K. Konkel, A. Loukus, T. Petersen

Degree Offered

Bachelor of Science in Applied Psychology

The Bachelor of Science in Applied Psychology prepares students for careers that apply the principles of psychology in diverse settings. The program provides a strong core curriculum in order for students to understand the foundations, theories, and principles of each area of psychology. As an applied program, both core and elective courses have a skills-based focus, allowing students to identify personal strengths, apply knowledge to real-world situations, create and implement new ideas, and ultimately be prepared to enter the workforce or continue on to graduate programs. A diverse offering of elective courses allows for students to focus on one or many areas of psychology, creating a unique opportunity for students to have an in-depth and personalized psychology degree. Students should consult with their advisor about specific interests for guidance in regards to elective offerings. The Applied Psychology program also offers Capstone in Applied Psychology (CAP) courses. These CAP courses vary by term and give senior students the opportunity to synthesize knowledge learned throughout the degree program and apply core principles and theories of psychology to a selected topic. Through an Applied Experience, students have the opportunity to participate in externships, advanced research courses, or community work to prepare themselves for exciting and rewarding careers in psychology or for additional coursework in graduate programs.

Mission Statement

The mission of the Applied Psychology Program is to enable students to apply core principles and theories of psychology and in-depth knowledge and skills in specific areas of psychology to communicate effectively, think critically, behave ethically and with cultural awareness, and work interpersonally with people from a wide variety of backgrounds.

Career Opportunities

Nationwide, college graduates with a bachelor's in psychology perform a wide variety of jobs or attend a wide variety of graduate programs. Graduates may work in counseling, education, social service, management, public relations, public health, and other fields. All of these jobs are potentially available to graduates of Oregon Tech's Applied Psychology Program. Many of Oregon Tech's Applied Psychology graduates have found jobs in Oregon and beyond. Human service employers include county and state agencies, as well as a wide range of private and nonprofit agencies. Graduates of Oregon Tech's Applied Psychology Program benefit from the emphasis of hands-on training and applied experiences. Graduates have also completed a Master of Arts in Teaching (MAT) and pursue careers in education, such as teaching, school counseling, and special education. Graduates have also been employed in industry and are following management training programs. Finally, graduates have pursued various Master's and doctoral programs in psychology and related fields.

Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Applied Psychology. A total of 180 credits are required for the degree. Students must complete a core program consisting of 71 credits; those core courses are PSY 201, PSY 202, PSY 203, PSY 215, PSY 216, PSY 301, PSY 311, PSY 312, PSY 313, PSY 317, PSY 330, PSY 331, PSY 334, PSY 335, PSY 339, PSY 455, PSY 475, PSY 255 or MATH 243 or MATH 361, and 12 credits toward an Applied Experience. Any of the following can count toward the Applied Experience: PSY 314, PSY 420, PSY 421, PSY 422, PSY 423, PSY 441, PSY 442, PSY 443, PSY 445, and/or PSY 497. Additionally, students are required to take 54 elective credits, and should work with their advisors to select elective courses that align closely with their interests and career goals. Students electing to take externship are restricted to a maximum of 32 credits. All core courses must be completed with a minimum grade of "C" in order to earn the degree.

Bachelor of Science in Applied Psychology

Curriculum

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>PSY 201</th>
<th>Psychology</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WRI 121</td>
<td>English Composition</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td>SPE 321</td>
<td>Laboratory Science Elective</td>
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<td></td>
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<td>Social Science Elective</td>
<td>3</td>
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<tr>
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<td></td>
<td>Total</td>
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<tr>
<td>Freshman Year</td>
<td>Winter</td>
<td>PSY 202</td>
<td>Psychology</td>
<td>3</td>
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<tr>
<td></td>
<td>WRI 122</td>
<td>Argumentative Writing</td>
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<td>SPE 321</td>
<td>Laboratory Science Elective</td>
<td>4</td>
<td></td>
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<tr>
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<td></td>
<td>Social Science Elective</td>
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<tr>
<td>Sophomore Year</td>
<td>Spring</td>
<td>PSY 203</td>
<td>Psychology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SPE 111</td>
<td>Public Speaking</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Laboratory Science Elective</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social Science Elective</td>
<td>3</td>
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<tr>
<td></td>
<td>Elective</td>
<td></td>
<td>Total</td>
<td>16</td>
</tr>
<tr>
<td>Sophomore Year</td>
<td>Fall</td>
<td>MATH 111</td>
<td>College Algebra</td>
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<td></td>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Humanities Elective</td>
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<td></td>
<td>Total</td>
<td>16</td>
</tr>
<tr>
<td>Sophomore Year</td>
<td>Winter</td>
<td>PSY 225</td>
<td>Applied Statistics for Social Sciences</td>
<td>4</td>
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<tr>
<td></td>
<td>PSY 216</td>
<td>Abnormal Psychology II</td>
<td>3</td>
<td></td>
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<td></td>
<td>PSY 311</td>
<td>Human Growth and Development I</td>
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<td></td>
<td>Communications Elective</td>
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<td></td>
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<td>Total</td>
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<tr>
<td>Sophomore Year</td>
<td>Spring</td>
<td>PSY 301</td>
<td>Basic Counseling Techniques</td>
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<tr>
<td></td>
<td>PSY 312</td>
<td>Human Growth and Development II</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td>PSY 313</td>
<td>Psychological Research Methods I</td>
<td>4</td>
<td></td>
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<td></td>
<td>PSY 317</td>
<td>Field and Career Preparation</td>
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<td></td>
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<td></td>
<td>Total</td>
<td>14</td>
</tr>
</tbody>
</table>
Graduate Certificate in Applied Behavior Analysis

The Certificate in Applied Behavior Analysis is a 27-credit, nine-course sequence for individuals who wish to pursue additional coursework in Applied Behavior Analysis. The Behavior Analyst Certification Board, Inc. has approved this course sequence as meeting the course work requirements for eligibility to take the Board Certified Behavior Analyst® exam. (Applicants for the BCBA® exam will have to meet additional requirements to qualify.)

Applied Behavior Analysis

Applied Behavior Analysis (ABA) is an evidence-based, data-driven, systematic approach to intervention. Practitioners of ABA apply principles of reinforcement and focus on applications that improve the quality of life for individuals.

Behavior analysts provide services in a variety of settings including schools, clinics, rehabilitation settings, residential facilities, social service agencies, mental health facilities, businesses, and client homes. They work with diverse populations including individuals and families affected by autism, developmental and intellectual disabilities, brain injury, mental health, geriatrics, child abuse, and neglect.

Program Objective

Meet the demand for competent behavior analysts by providing BACB® approved coursework to professionals seeking national certification and/or licensure as a behavior analyst in Oregon.

Required Courses (27 credits)

ABA 511 Foundations of Applied Behavior Analysis I 3
ABA 512 Foundations of Applied Behavior Analysis II 3
ABA 521 Ethics and Professionalism I 3
ABA 522 Ethics and Professionalism II 3
ABA 525 Research Methods in ABA 3
ABA 526 Behavioral Assessment 3
ABA 531 Behavior Change I 3
ABA 532 Behavior Change II 3
ABA 535 Special Topics in ABA 3
Population Health Management

Dr. Sophia Lyn Nathenson, Program Director
Dr. Sophia Lyn Nathenson, Externship Coordinator
Participating Faculty: Dr. M. Arthur

Degree Offered
Bachelor of Science in Population Health Management

The Population Health Management (PHM) professions are auxiliary or complementary to clinical healthcare. The PHM B.S. degree program includes core courses in applied and medical sociology, in addition to electives in applied psychology, management, mathematics, communication, and health sciences. Students may choose one of three emphases: Health Counseling/Outreach, Care Management and Coordination, and Applied Health Data Analytics.

The PHM program begins with a foundation in sociological theory, methods and research.

PHM graduates will gain competence in social theory, research methods, statistics, program planning and evaluation, and training in working with diverse and underserved populations.

Mission Statement
The mission of the PHM program is to provide students with the best possible training for careers that improve health and well-being. As the United States healthcare system changes to adapt to a new demographic and health landscape, increasing emphasis is placed on preventative medicine and health maintenance. PHM graduates will help fill this pressing need, providing much needed health resources to hospitals, schools, governmental and non-profit organizations, and local communities. Such work empowers individuals through health programs and policy, to create a healthier future for our nation.

Career Opportunities
Students who graduate from the PHM program may work in a wide variety of settings, all with the intent of improving the health and well-being of individuals and communities. Careers include health coaching, health research, community health program and evaluation, education, and patient advocacy. The PHM degree is an ideal preparation for graduate study in sociology, epidemiology, public health and medicine.

Degree Requirements
Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Population Health Management. A total of 181 credits are required for the degree. Students must complete a core program; in addition, students must complete an emphasis area (listed below). A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed. Credits taken for externship or senior project do not count toward the emphasis. Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

Emphasis Requirements
Students completing the Health Counseling and Outreach emphasis must complete the following courses:

SOC 315 Juvenile Delinquency
SOC 405 Program Planning and Evaluation

Students completing the Applied Health Data Analytics emphasis must complete the following courses:

BUS 316 Total Quality in Healthcare
MATH 362 Statistical Methods II
MATH 465 Mathematical Statistics,
MIS 344 Healthcare Info Systems Management
MIS 357 Information/Communication Systems-Healthcare
MIS 445 Legal/Ethical/Social Issues in Healthcare Technology
PSY 339 Biopsychology
SOC 405 Program Planning and Evaluation
WRI 123 Research Writing
WRI 227 Technical Report Writing
WRI 410 Proposal and Grant Writing

Students completing the Care Management and Coordination emphasis must complete the following courses:

ANTH 103 Introduction to Cultural Anthropology
BIO 200 Medical Terminology
BIO 231 Human Anatomy and Physiology I
BIO 232 Human Anatomy and Physiology II
BIO 233 Human Anatomy and Physiology III
BUS 313 Healthcare Systems and Policy
BUS 316 Total Quality in Healthcare
COM 205 Intercultural Communication
COM 345 Organizational Communication
PSY 347 Organizational Behavior
PSY 360 Organizational Psychology
PSY 410 Organizational Change and Development
SOC 305 Rural Health

Students completing the Program Planning and Evaluation emphasis must complete the following courses:

BUS 316 Total Quality in Healthcare
MATH 362 Statistical Methods II
MATH 465 Mathematical Statistics,
MIS 344 Healthcare Info Systems Management
MIS 357 Information/Communication Systems-Healthcare
MIS 445 Legal/Ethical/Social Issues in Healthcare Technology
PSY 339 Biopsychology
SOC 405 Program Planning and Evaluation
WRI 123 Research Writing
WRI 227 Technical Report Writing
WRI 410 Proposal and Grant Writing
Bachelor of Science in Population Health Management (Applied Medical Sociology)

Curriculum

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 275</td>
<td>History of Medicine</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SOC 204</td>
<td>Introduction to Sociology</td>
<td>3</td>
<td>3</td>
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<tr>
<td>WRI 121</td>
<td>English Composition</td>
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</tr>
<tr>
<td>Humanities Elective</td>
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* See advisor or consult emphasis Elective list below for appropriate courses.
** To complete an emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives. A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed.
*** Externship site and/or senior projects are coordinated in SOC 421 Senior Project Preparation.
**** Externship site and/or senior projects are coordinated in SOC 421 Senior Project Preparation.

Emphasis Electives

Health Counseling and Outreach Emphasis:


Care Management and Coordination Emphasis:


Applied Health Data Analytics Emphasis:


Total credits required for B.S. in Population Health Management: 181
Oregon Transfer Module (OTM)

The Oregon Transfer Module (OTM) provides a one-year curriculum for students who plan to transfer to a State of Oregon community college or university. The module allows students to complete one year of general education foundation course work that is academically sound and will meet the admission standards of the receiving school. Students should work closely with an academic advisor to ensure selection of appropriate course work. Upon transfer, students may be required to complete additional course work in general education or an academic major specific to the receiving institution. Students who transfer prior to the completion of the Oregon Transfer Module will have their courses individually evaluated by the receiving institution. Students must complete a minimum of 45 credits of lower division course work with a grade of “C-” or better in order to receive credit for the Oregon Transfer Module. A minimum of 12 credits must be earned at Oregon Tech. The following courses may be used to complete the Oregon Transfer Module:

**FOUNDATIONAL SKILLS**

**Writing and Oral Communication**

**Writing**
Two courses of college level composition

**Oral Communication**
One course of Public Speaking or Communication

**Mathematics**
One course of College level Math

**INTRODUCTION TO DISCIPLINES**

**Arts and Letters/Humanities**
3 courses of Arts and letters/Humanities
Oregon Tech only allows 3 credits of performance or studio-based courses in this category

**Science/Math/Computer Science**
3 courses, including at least one biological or physical science with a laboratory

**Social Science**
3 courses of Social Science
Management Department

Hallie Neupert, Department Chair; Program Director, Health Care Management, and Curriculum Coordinator, Entrepreneurship/Small Business Management and Marketing
Richard Bailey, Curriculum Coordinator, Accounting
Jeff Dickson, Program Director and Curriculum Coordinator, Health Informatics
Carmen Morgan, Program Director, Accounting, Entrepreneurship/Small Business Management and Marketing
Pat Schaeffer, Program Director and Curriculum Coordinator, Information Technology
Kris Rosenberg, Program Director and Curriculum Coordinator, Operations Management
Maureen Sevigny, Program Director, Management Distance Education, Program Director and Curriculum Coordinator, BAS Technology and Management

Professors: R. Bailey, H. Neupert, M. Sevigny
Associate Professors: G. Kirby, C. Morgan, M. Pierce, P. Schaeffer
Assistant Professors: M. Ahalt, S. Bailey, S. Beaudry, D. DaSaro, J. Dickson, J. Jackson, K. Rosenberg, K. Weidman

Degrees Offered
Bachelor of Science in Health Care Management, with options in: Administration, Clinical, Radiologic Science Management
Bachelor of Science in Health Informatics
Bachelor of Science in Information Technology
Bachelor of Science in Management, with options in: Accounting, Entrepreneurship and Small Business, Management, Marketing
Bachelor of Science in Operations Management
Bachelor of Applied Science in Technology and Management

Minors Offered
- Business
- International Business
- Information Technology

Specializations Offered
- Accounting
- Entrepreneurship/Small Business Management
- Marketing
- Travel and Tourism

Certificate Offered
- Accounting (post baccalaureate)

Emphasis Offered
- Six Sigma Green Belt Certification
- Renewable Energy Management Emphasis

The Management Department prepares students to take their place as leaders and managers in contemporary public and private organizations. Faculty members have been selected for their managerial experience and expertise in a diverse array of production and service industries.

Coursework in the Management programs builds upon a fundamental core of courses including management, marketing, accounting, finance, information systems, economics, ethics, organizational behavior, business law and business presentations. These courses, along with program-specific courses, prepare students for their senior year which includes a senior experience and a capstone course. The senior experience provides management students with an opportunity to integrate their educational experience in the context of a "real world" business problem or project.

As a result of this unique combination of resources and coursework, the Management Degree Programs remain vital and up-to-date, providing students with both the technical tools of management and the interpersonal skills that employers most desire. Equally important, each graduate will be ready to perform as an effective citizen in a culturally diverse, global work place.

Department Outcomes
Upon graduating, Management Department graduates should be able to:
1. Explain the major concepts in the functional areas of accounting, marketing, finance and management.
2. Evaluate the legal, social and economic environments of business.
3. Describe the global environment of business.
4. Describe and explain the ethical obligations and responsibilities of business.
5. Apply decision-support tools to business decision making.
6. Construct and present effective oral and written forms of professional communication.
7. Apply knowledge of business concepts and functions in an integrated manner.
8. Use management processes in an applied organization or business situation.

Degree Completion and Co-enrollment at Community Colleges
The Management Department has worked with many Oregon community colleges to develop Joint Enrollment, Transfer Credit (Articulation) Agreements and course sequences so that students may complete a degree with coursework taken from multiple institutions. See the general education requirements section of this catalog, the Oregon Tech Registrar's Office's website, or a management advisor for additional information.

Oregon Tech Online
Many of the management degrees and core management courses are available online to facilitate the needs of degree completion students. Online courses are particularly appropriate for students capable of self-directed educational activities. Online degrees and courses are offered utilizing Internet delivery and collaborative learning. Degrees available online are: BS in Health Care Management, Clinical Option, Radiologic Sciences Management Option; BS in Operations Management; BS in Health Informatics; BS in Information Technology, Applications Development Option, and Business/Systems Analysis Option; BAS in Technology and Management.

Required Student Equipment
Successful completion of these degrees requires intensive, hands-on use of computers. Therefore, all students are required to own

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their own computer. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

Accreditation
Oregon Tech has received specialized accreditation for its business programs through the International Assembly for Collegiate Business Education (IACBE).

Program Note
Students graduating with a Management Department degree are required to take a standardized exit exam in their last year.

Health Care Management

Degree Offered
Bachelor of Science in Health Care Management with options in:
- Administration
- Clinical
- Radiologic Science Management

The Health Care Management degree fully prepares students to assume managerial and supervisory positions in the healthcare industry. Health care managers plan, direct, and coordinate medical and health services. They might manage an entire facility, a specific clinical area or department, or a medical practice for a group of providers. Oregon Tech's Health Care Management degree includes three options to meet the student's specific needs and interests.
### Bachelor of Science in Health Care Management, Administration Option

#### Administration Option
This program offers a BS in Health Care Management to students whose interests lie in business and health care administration. The curriculum is designed to prepare the graduate for entry- and mid-level management positions and/or preparation to enter Master's programs in Health Care Administration, Hospital Administration or Public Health. Based on a core of common management courses, the program builds a broader base of understanding of the health care system in the U.S. and its systems, policies and challenges. Students choosing the Administration option also complete a Medical Sociology minor as part of their studies. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Administration Option is offered in Klamath Falls.

#### Student Preparation and Admissions
Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

### Curriculum
Required courses and recommended terms during which they should be taken:

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<tbody>
<tr>
<td>BUS 442</td>
<td>Leadership II</td>
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<td>BUS 497</td>
<td>Senior Project</td>
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<tbody>
<tr>
<td>BUS 478</td>
<td>Strategic Management</td>
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<tr>
<td>WRI 410</td>
<td>Proposal and Grant Writing</td>
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Total credits required for B.S. in Health Care Management: Administration Option: 182
Bachelor of Science in Health Care Management, Clinical Option

Clinical Option
This program bridges two disciplines; Allied Health and Management. The clinical option requires a current state and/or national registry, license or certificate in an approved allied health field. The degree prepares Allied Health professionals for advancement to management or supervisory roles. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Clinical Option is offered in Klamath Falls and online.

Student Preparation and Admissions
To be eligible for admission to the Health Care Management, Clinical Option, students must meet the following criteria:
1. Meet the Oregon Tech general admissions requirements.
2. Provide documentation of a current state and/or national registry, license, or certificate in an approved allied health field.

Each prospective student’s academic credits and registry, license, or certificate will be individually evaluated to determine transferability and acceptability of the course work.

Curriculum
Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Prior Learning</th>
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<tbody>
<tr>
<td>Registry Transfer Credits</td>
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<tbody>
<tr>
<td>ACC 201</td>
<td>Principles of Accounting I</td>
</tr>
<tr>
<td>BIO 231</td>
<td>Human Anatomy and Physiology I</td>
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<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<tbody>
<tr>
<td>BIO 232</td>
<td>Human Anatomy and Physiology II</td>
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<td>MIS 102</td>
<td>Spreadsheets Lab</td>
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<tbody>
<tr>
<td>ACC 325</td>
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<td>BUS 308</td>
<td>International Business</td>
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<td>BUS 313</td>
<td>Health Care Systems and Policy</td>
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<td>Introduction to Database Systems</td>
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<tr>
<td>BIO 200</td>
<td>Medical Terminology</td>
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<tr>
<td>BUS 349</td>
<td>Human Resource Management I</td>
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<tr>
<td>ECO 201</td>
<td>Principles of Economics, Microeconomics</td>
</tr>
<tr>
<td>MATH 243</td>
<td>Introductory Statistics</td>
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<tr>
<td>Or</td>
<td>MATH 361 Statistical Methods I</td>
</tr>
<tr>
<td>PHIL 331</td>
<td>Ethics in the Professions</td>
</tr>
<tr>
<td>Or</td>
<td>PHIL 342 Business Ethics</td>
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<tbody>
<tr>
<td>BUS 356</td>
<td>Business Presentations</td>
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<tr>
<td>BUS 223</td>
<td>Marketing I</td>
</tr>
<tr>
<td>Or</td>
<td>BUS 337 Principles of Health Care Marketing</td>
</tr>
<tr>
<td>BUS 495</td>
<td>Senior Project Proposal</td>
</tr>
<tr>
<td>COM 205</td>
<td>Intercultural Communication</td>
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<tr>
<td>ECO 202</td>
<td>Principles of Economics, Macroeconomics</td>
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<td>SPE 321</td>
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<tr>
<td>BUS 441</td>
<td>Leadership I</td>
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<td>BUS 467</td>
<td>Service Management</td>
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<td>BUS 496</td>
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<td>Or</td>
<td>BUS 420 Applied Management Internship</td>
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<tbody>
<tr>
<td>BUS 316</td>
<td>Total Quality in Health Care</td>
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<tr>
<td>BUS 497</td>
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<td>Upper Division Elective</td>
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<td>Humanities Elective</td>
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<td>Proposal and Grant Writing</td>
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Total credits required for B.S. in Health Care Management: Clinical Option: 182
Radiologic Science Management Option

This program offers a BS in Health Care Management to students who hold a current registry through the American Registry of Radiologic Technologists (ARRT) and who wish to enhance their career by obtaining a management degree with emphasis on management of a medical imaging facility or department. It is designed for the radiologic technologist seeking skills and credentials that enable advancement to positions of middle management. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Radiologic Science Management Option is fully online with no requirement to come to campus and does not require clinical practice involving patient contact.

Student Preparation and Admissions

Students must be registered through the ARRT and be in good standing. Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

Curriculum

This curriculum map is arranged in the typical term by term format; however, online degree completion students should consult with their academic advisor regarding course scheduling.

Prior Learning

Registry Transfer Credits 89

Sophomore Year  

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<tr>
<th>Fall</th>
<th>Course</th>
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<td>Introduction to Database Systems</td>
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<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
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Sophomore Year  

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<td>SPE 321</td>
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<td>WRI 122</td>
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Sophomore Year  

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<tr>
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<td>BUS 337</td>
<td>Health Care Marketing</td>
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<tr>
<td>ECO 201</td>
<td>Principles of Economics, Micro</td>
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Junior Year  

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<tr>
<td>BUS 313</td>
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<td>MATH 243</td>
<td>Introductory Statistics</td>
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<td>MATH 361</td>
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Junior Year  

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Junior Year  

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<td>BUS 356</td>
<td>Business Presentations</td>
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Senior Year  

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<td>Research Methods</td>
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<tr>
<td>BUS 496</td>
<td>Senior Project</td>
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</tr>
<tr>
<td>Or</td>
<td></td>
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<tr>
<td>BUS 420</td>
<td>Applied Management Internship</td>
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<td>MIS 345</td>
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Senior Year  

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<tr>
<td>BUS 497</td>
<td>Senior Project</td>
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</tr>
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<td>PHIL 331</td>
<td>Ethics in the Professions</td>
<td>3</td>
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<tr>
<td>Or</td>
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<td>PHIL 342</td>
<td>Business Ethics</td>
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<td>PSY 347</td>
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Senior Year  

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<td>RDSC 365</td>
<td>Advanced Quality Assurance/Quality Control</td>
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<td>Proposal and Grant Writing</td>
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* Any ACC, BUS, MGT, MIS course which is not required in your program and as approved by your advisor.

Total credits required for B.S. in Health Care Management: Radiologic Science Option: 205
Health Informatics

**Degree Offered**
Bachelor of Science in Health Informatics

**Objectives**
The field of Health Informatics is encapsulated in the combination of biology, computer science and information science. This program evaluates the sub-disciplines of clinical and computational informatics; emphasizing the integration of computer science and the impact of clinical outcomes.

The BS in Health Informatics is offered in Klamath Falls, Wilsonville and through Oregon Tech Online.

**Career Opportunities**
Health Informatics professionals work in operational and management positions throughout the healthcare industry in such locales as hospitals, clinics, managed care, software vendors and government agencies. Health Informatics professionals are called upon to design and use emerging information technologies with the goal of helping providers and patients access and utilize information to provide improved health care.

Health Informatics professionals provide support in clinical decision making, data architecture, application interfacing, clinical analytics, data analysis, systems analysis and project management.

**Student Preparation and Admissions**
Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

### Bachelor of Science in Health Informatics Curriculum
Required courses and recommended terms during which they should be taken:

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<td>MIS 255 Health Informatics Concepts and Practices</td>
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<td>SPE 111 Public Speaking</td>
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<td>ECO 201 Principles of Economics, Microeconomics</td>
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<td>MIS 102 Spreadsheet Software Laboratory</td>
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<td>MIS 256 Hardware/Software Integration</td>
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<tbody>
<tr>
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<td>MATH 361 Statistical Methods I</td>
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<td>MIS 118 Programming Fundamentals</td>
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<td>BIO 103 Introduction to Human Anatomy</td>
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<td>BUS 223 Marketing I</td>
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<td>or</td>
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<tr>
<td>BUS 337 Principles of Health Care Marketing</td>
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<td>MGT 335 Project Management</td>
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<tbody>
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<td>BUS 313 Health Care Systems and Policy</td>
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Total credits required for B.S. in Health Informatics: 181
Information Technology

**Degree Offered**
Bachelor of Science in Information Technology

**Objectives**
The Bachelor of Science in Information Technology with its three options offers a challenging, state-of-the-art education for those interested in learning the dynamic and growing field of information technology. The field is interdisciplinary, with applications to all aspects of the economy. Graduating students are prepared to bridge the technology and management disciplines in their organizations. Core business disciplines taught include analytical skills and problem solving, business organization and management, project management, leadership, teams, and communications. In addition to the core business disciplines students choose an information technology focus in one of four options: applications development, business/systems analysis, health informatics or accounting. Each option is designed to produce graduates with the competencies necessary to succeed in the workplace or pursue further graduate level education.

**Career Opportunities**
The Oregon Tech Information Technology degree with three options prepares students for a wide range of professions including accounting information systems, database administration, systems analyst, business systems consultant, network analyst, software applications specialist, PC support technician, technical writer, Web administrator and as vendor representatives for both hardware and software firms. Information Technology graduates are currently employed at firms including Consolidated Freightways, Hewlett-Packard, Microsoft and Intel. Through a combination of technical skills and business understanding, Information Technology graduates are uniquely prepared for faster advancement than many of their contemporaries.

**Graduation Requirements**
Graduation requirements for the Bachelor of Science Degree in Information Technology include 181 credit hours.

### Bachelor of Science in Information Technology

#### Curriculum

**Required courses and recommended terms during which they should be taken:**

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*Students must choose, in consultation with their advisor, a minimum of 31 credits of focused upper division Electives.

Total credits required for B.S. in Information Technology: 181
Management

Degree Offered
Bachelor of Science in Management, with options in:
Accounting
Entrepreneurship/Small Business Management
Marketing

Objectives
The Management degree prepares leaders to manage organizations in the high technology environments of the 21st century. Students develop their abilities to contribute to an organization’s performance through hands-on experience built on a solid theoretical base. The Management curriculum skillfully integrates a solid core of business/management courses with the unique benefits of one of the country’s leading institutes of technology. Students will also be prepared for graduate level education, such as the Master’s in Business Administration (MBA) degree.

Career Opportunities
The Management Department is known for producing “user-friendly” graduates.

Recruiters from industry and government agencies regularly visit the campus in search of Management Department bachelor degree candidates. Initial job titles include staff accountant, cost analyst, business unit manager, supervisor, marketing specialist, and sales manager.

Graduation Requirements
Graduation requirements for the Bachelor of Science degree in Management include 181 credit hours for the Entrepreneurship/Small Business Management option, the Marketing option, and the Accounting option.
Bachelor of Science in Management, Accounting Option

The accounting option is designed to prepare students for careers in public or private accounting. Students become familiar with computerized accounting applications and skilled in the principles of tax, financial, and cost accounting. Upon graduation students selecting this option should have sufficient knowledge to sit for the Certified Public Accountant (CPA) and the Certified Management Accountant (CMA) exams.

Curriculum

Required courses and recommended terms during which they should be taken:

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Total credits required for B.S. in Management, Accounting Option: 181
Bachelor of Science in Management, Entrepreneurship/Small Business Management Option

Entrepreneurship/Small Business Management Option

Students selecting the entrepreneurship/small business management option will equip themselves to be managers with complete understanding of all aspects of a business - either a small business or a business unit manager in a larger business. The focus is on the unique demands placed on this type of manager. Skills in writing business plans, starting and operating a business, cash flow management, costing and pricing products and global opportunities are emphasized and developed.

Curriculum

Required courses and recommended terms during which they should be taken:

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Total credits required for B.S. in Management, Entrepreneurship/Small Business Option: 181
# Bachelor of Science in Management, Marketing Option

## Marketing Option

The marketing option provides students with a broad background in business management with a strong emphasis in modern marketing concepts and practices. Marketing graduates enjoy careers in management, advertising, research, consulting, distribution, sales and entrepreneurial enterprises. This program provides students with core management courses, in-depth business computer applications, detailed marketing courses, experience on individual and team projects, and preparation for entry into a master’s program.

## Curriculum

Required courses and recommended terms during which they should be taken:

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<td>BUS 434</td>
<td>Global Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BUS 442</td>
<td>Leadership II</td>
<td>3</td>
</tr>
<tr>
<td>BUS 478</td>
<td>Strategic Management</td>
<td>3</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
</tbody>
</table>

Total credits required for B.S. in Management, Marketing Option: 181
Operations Management

Degree Offered
Bachelor of Science in Operations Management

Objectives
Operations Management is concerned with the oversight and coordination of equipment, materials, human capital and information required of a business operation to profitably deliver goods and services to the customers it serves. It involves the responsibility of ensuring operations are efficient and effective in terms of meeting and exceeding customer requirements. Operations Managers successfully blend the art of management with applied science through creativity, people skills, rational analysis and application of technology.

The Bachelor of Science in Operations Management degree program prepares students for leadership positions within a wide variety of product and service industries. Students selecting Operations Management develop mastery of concepts, tools, and skills in management sciences and specialties tailored to the industries of interest to the student upon graduation. Particular emphasis is directed toward development of skills in problem solving, project management, communication, and managing effectively in team-based work environments. Students are also prepared for graduate level education, such as the MBA (Master’s in Business Administration) degree. The BS in Operations Management is offered in Klamath Falls, Wilsonville and online.

Career Opportunities
Recruiters from industry and government agencies regularly visit the campus in search of bachelor’s degree candidates in operations management. Initial job titles include: production planner, inventory control analyst, industrial engineer, production supervisor, and quality control manager. Typical departments in which graduates find themselves working are manufacturing, manufacturing engineering, industrial engineering, production control, finance, and quality assurance.

Students selecting the Operations Management degree will equip themselves to be managers in the challenging environment of modern manufacturing and service industries. Upon graduation they should be prepared to address critical issues related to productivity management in a global competitive economy and play leadership roles in the design and implementation of quality control and management programs. They will have mastered a wide array of microcomputer technology and software applications, giving them a competitive edge in the job market.

Graduation Requirements
Graduation requirements for the Bachelor of Science degree in Operations Management includes 180 credit hours.
# Bachelor of Science in Operations Management Curriculum

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Junior Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 215</td>
<td>Principles of Management</td>
<td>ACC 325</td>
<td>Finance</td>
</tr>
<tr>
<td>PSY 201</td>
<td>Psychology</td>
<td>BUS 457</td>
<td>Business Research Methods II</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
<td>MGT 321</td>
<td>Operations Management I</td>
</tr>
<tr>
<td></td>
<td>Humanities Elective</td>
<td>MGT 461</td>
<td>Lean/Six Sigma Management I</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Winter</th>
<th>Junior Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 111</td>
<td>College Algebra</td>
<td>MGT 322</td>
<td>Operations Management II</td>
</tr>
<tr>
<td>MIS 102</td>
<td>Spreadsheet Software Laboratory</td>
<td>MGT 462</td>
<td>Lean/Six Sigma Management II</td>
</tr>
<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
<td>WRI 327</td>
<td>Advanced Technical Writing</td>
</tr>
<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
<td>BUS 349</td>
<td>Human Resource Management I</td>
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<thead>
<tr>
<th>Freshman Year</th>
<th>Spring</th>
<th>Junior Year</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 223</td>
<td>Marketing I</td>
<td>BUS 495</td>
<td>Senior Project Proposal</td>
</tr>
<tr>
<td>ECO 201</td>
<td>Principles of Economics, Microeconomics</td>
<td>MGT 323</td>
<td>Operations Management III</td>
</tr>
<tr>
<td>MIS 206</td>
<td>Introduction to Management Information Systems</td>
<td>MGT 335</td>
<td>Project Management</td>
</tr>
<tr>
<td>WRI 227</td>
<td>Technical Report Writing</td>
<td>MGT 463</td>
<td>Lean/Six Sigma Management III</td>
</tr>
<tr>
<td></td>
<td>Humanities Elective</td>
<td>MIS 375</td>
<td>Decision Support Systems</td>
</tr>
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<td><strong>Total</strong></td>
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<table>
<thead>
<tr>
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<th>Fall</th>
<th>Senior Year</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 201</td>
<td>Principles of Accounting I</td>
<td>BUS 420</td>
<td>Applied Management Internship or</td>
</tr>
<tr>
<td>MATH 361</td>
<td>Statistical Methods I</td>
<td>BUS 496</td>
<td>Senior Project or</td>
</tr>
<tr>
<td>MIS 113</td>
<td>Introduction to Database Systems</td>
<td>BUS 497</td>
<td>Laboratory Science Elective</td>
</tr>
<tr>
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<td>Elective</td>
<td>BUS 441</td>
<td>Leadership I</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
<td>BUS 467</td>
<td>Service Management</td>
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<tr>
<td><strong>Total</strong></td>
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<td>MGT 421</td>
<td>Quality Management</td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Winter</th>
<th>Senior Year</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 226</td>
<td>Business Law</td>
<td>ANTH 452</td>
<td>Globalization or</td>
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<tr>
<td>ECO 202</td>
<td>Principles of Economics, Microeconomics</td>
<td>PSCI 326</td>
<td>World Politics in Transition</td>
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<tr>
<td>MATH 371</td>
<td>Finite Mathematics and Calculus I</td>
<td>BUS 497</td>
<td>Senior Project</td>
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<td>Elective</td>
<td>MGT 422</td>
<td>Materials Management</td>
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<td>Elective</td>
<td>PHIL 331</td>
<td>Ethics in the Professions</td>
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<tr>
<td><strong>Total</strong></td>
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<td>PSY 347</td>
<td>Organizational Behavior</td>
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<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Spring</th>
<th>Senior Year</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 203</td>
<td>Principles of Managerial Accounting</td>
<td>BUS 478</td>
<td>Strategic Management</td>
</tr>
<tr>
<td>BUS 356</td>
<td>Business Presentations</td>
<td>MGT 423</td>
<td>Logistics Management</td>
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<tr>
<td>BUS 456</td>
<td>Business Research Methods</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
<td><strong>Total</strong></td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

Total credits required for B.S. in Operations Management: 180
Bachelor of Applied Science in Technology and Management

**Curriculum**

Required courses and recommended terms during which they should be taken:

### Freshman Year

Up to 60 Career Technical Elective credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 201</td>
<td>Principles of Accounting I</td>
<td>4</td>
</tr>
<tr>
<td>BUS 215</td>
<td>Principles of Management</td>
<td>4</td>
</tr>
<tr>
<td>BUS 304</td>
<td>Engineering Management</td>
<td>3</td>
</tr>
<tr>
<td>BUS 317</td>
<td>Health Care Management</td>
<td>3</td>
</tr>
<tr>
<td>ECO 201</td>
<td>Principles of Economics, Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 111</td>
<td>College Algebra</td>
<td>4</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td><strong>16</strong></td>
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</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 203</td>
<td>Principles of Managerial Accounting</td>
<td>4</td>
</tr>
<tr>
<td>ECO 202</td>
<td>Principles of Economics, Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>MIS 206</td>
<td>Introduction to Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>15</strong></td>
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</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>MGT 321</td>
<td>Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 461</td>
<td>Lean/Six Sigma Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS 275</td>
<td>Introduction to Relational Databases</td>
<td>3</td>
</tr>
<tr>
<td>MIS 113</td>
<td>Introduction to Database Systems</td>
<td>3</td>
</tr>
<tr>
<td>WRI 227</td>
<td>Technical Report Writing</td>
<td>3</td>
</tr>
<tr>
<td>MATH 361</td>
<td>Statistical Methods I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**Technical Electives include upper-division courses in ACC, BUS, MGT, MIS, GIS, or PSY.**

*Note: The BAS degree specifies 60 upper-division credits. Students transferring in lower-division course equivalents do not receive upper-division credit and may be required to take upper-division electives to meet the minimum 60 credits of upper-division credits required for the BAS degree.*

**Total credits required for B.A.S. in Technology and Management:** 180

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**Graduation Requirements**

The BAS in Technology and Management requires 180 credits including 60 upper-division credits and up to 60 lower-division career and technical education (CTE) credits transferred from an AAS or AS degree. In addition, the BAS includes 55 general education credits including 18 credits in communication, 12 credits of social science, 9 credits in humanities and 16 credits of math and science including 4 credits of mathematics with a prerequisite of intermediate algebra or higher and 4 credits of laboratory science.
Business Minor
The Minor in Business recognizes the achievement of 23 credits in business courses, some of which can be related to the student's chosen profession. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The Minor in Business may prove valuable to a technical student who ventures into management or consulting in his or her career field. It may enhance employability and improve graduate school possibilities. This minor is open to all majors except those in the Management Department.

Requirements of Minor:
ACC 201 Principles of Accounting I 4
ACC 203 Principles of Managerial Accounting 4
BUS 215 Principles of Management 3
or
BUS 304 Engineering Management 3
or
BUS 317 Health Care Management 3
BUS 223 Marketing I 3
PSY 347 Organizational Behavior 3

And two courses chosen from upper-division BUS or MGT courses not on the required list, or MIS 311 or PSY 410.

A passing grade and a cumulative GPA of 2.0 or better in the business minor courses is required. Students are encouraged to consult with a Management Department advisor to select business courses that would be most applicable to their major and/or career goals.

Information Technology Minor
The Information Technology (IT) Minor recognizes the achievement of 29/30 credits in technical courses. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The IT minor may prove valuable to management or technical students who want to demonstrate that they have additional skills in management information systems and information technology areas. It may enhance employability and improve graduate school possibilities. The minor is open to all majors except IT and HI.

Requirements of Minor:
MIS 118 Programming Fundamentals or Programming Elective 4
MIS 218 Database Programming or Programming Elective 4
MIS 275 Introduction to Relational Databases 3
MIS 311 Introduction to Systems Analysis 3
MIS 312 Systems Analysis I 4
MIS 341 Relational Database Design I 4
MIS 442 Advanced Database Application Programming 4
MIS 322 Systems Analysis II or BUS 344 Business Intelligence 4/3

International Business Minor
The Minor in International Business recognizes the achievement of 22 credits in international courses. The Minor in International Business may prove valuable to a technical student who ventures into management or consulting in his or her career field. It may enhance employability and improve graduate school possibilities. This minor is open to all majors and is especially recommended for students with an interest in management and/or global affairs.

Requirements of Minor:
BUS 308 Principles of International Business 3
BUS 387 International Human Resource Management 3
or
PSCI 326 World Politics in Transition 3
or
PSCI 497 United States Foreign Policy 3
BUS 434 Global Marketing 3
COM 205 Intercultural Communication 3
ECO 367 International Economics and Finance Management 4
MIS 311 Introduction to Systems Analysis 3
PSCI 250 Introduction to World Politics 3
Total 22

Suggested Social Science Electives
GEOG 106 Cultural Geography I 3
HIST 103 History of Western Civilization 3
PSCI 326 World Politics in Transitions 3
PSCI 497 United States Foreign Policy 3

Suggested Open Electives
COM 320 Advanced Intercultural Communication 3
Any foreign language sequence 4-4-4

Suggested Humanities Electives
Any second year foreign language sequence 4-4-4

Strongly Recommended
Study Abroad Program—1 semester/2 terms 4-4-4

A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor. Students are encouraged to consult with a Management Department advisor to schedule courses.

Specialization Programs
Oregon Tech offers four specializations as a complement to the three Bachelor of Science degree options in Management. These are Accounting, Entrepreneurship and Small Business Management, Marketing, and Travel and Tourism. The courses in the Accounting, Entrepreneurship and Small Business Management, and Marketing specializations have been selected from the curricular content of the three corresponding degree options. The courses in the Travel and Tourism specialization have been developed specifically for this specialization. They are online courses offered by the Department of Management through Oregon Tech Online.

Accounting
Oregon Tech's specialization in Accounting prepares the student for a wide range of accounting related positions in modern technological industries, financial institutions and other service-oriented businesses. The program includes training in computer software essential to accounting functions. This hands-on exposure can qualify the student for work in many high technology industries which utilize computer accounting applications.

Required Courses
ACC 201 Principles of Accounting I 4
ACC 202 Principles of Accounting II 4
ACC 203 Principles of Managerial Accounting 4
ACC 205 Computerized Accounting 3
MIS 102 Spreadsheet Software Laboratory 1

Entrepreneurship and Small Business Management
Oregon Tech's specialization in Entrepreneurship/Small Business Management provides the student with foundational skills and background in business management emphasizing entrepreneurship. The student should learn skills needed to start a business successfully, gain the knowledge required to run small businesses, and develop the entrepreneurship skills to make big companies run like small companies.

Required Courses
BUS 215 Principles of Management 3
BUS 223 Marketing I 3
BUS 314 Entrepreneurship I 3
Marketing
Oregon Tech's specialization in Marketing provides the student with a foundational background in business management with an emphasis in modern marketing concepts and practices. Upon completion, the student should be better qualified for a career in management, advertising, consulting, distribution or sales.

Required Courses
BUS 215 Principles of Management  3
BUS 223 Marketing I  3
BUS 318 Marketing II  3
BUS 319 Integrated Marketing Communication  3
BUS 326 Sales and Sales Management  3

Travel and Tourism
Oregon Tech's 15 credit online specialization in Travel and Tourism provides students with a broad foundational background in the hospitality and tourism industries. The information contained in these courses is important for anyone interested in learning more about the travel industry or who likes to travel. This specialization also gives students the knowledge necessary to obtain entry level positions in the hospitality and tourism industries.

Required Courses
BUS 309 Introduction to Tourism  3
BUS 347 Geography of Travel and Tourism  3
BUS 350 Hospitality Management  3
BUS 358 Marketing for Hospitality and Tourism  3

Six Sigma Green Belt Emphasis
The Management Department offers students the opportunity to earn a Six Sigma Green Belt Certificate. The Green Belt Certificate is an emphasis under the Bachelor of Science in Management, Entrepreneurship/Small Business Management option, Management, Marketing option or the Operations Management degree program. In addition to the fundamental management curriculum, the emphasis requires the completion of a Lean/Six Sigma project. Those attaining the emphasis will be well-positioned to work in companies that deploy Lean Six Sigma.

Additionally, employees of companies that deploy Lean Six Sigma may complete the course work and project to obtain their certificate.

Students completing the Six Sigma Green Belt Emphasis must complete the following courses and their prerequisites. Prerequisites may be waived for industry students depending on their individual backgrounds and abilities.

- BUS 457 Business Research Methods II  3
- BUS 496 Senior Project  3
- MGT 335 Project Management  3
- MGT 461 Lean/Six Sigma Management I  3
- MGT 462 Lean/Six Sigma Management II  3
- MGT 463 Lean/Six Sigma Management III  3

It should be noted that for OM majors, all of these courses are currently in the curriculum map. No additional coursework is required. With approval, the student's senior project may also be considered for the Six Sigma Green Belt Certificate.

Renewable Energy Management Emphasis
The Management Department offers students the opportunity to complete a Renewable Energy Management emphasis under the Bachelor of Science in Management, Entrepreneurship/Small Business Management option or the Operations Management degree program. In addition to the fundamental management curriculum, the emphasis requires additional coursework in chemistry, management information systems, humanities, history, economics and management. Those attaining the emphasis will be prepared to successfully integrate skills in the social, environmental, economic, business and management aspects of energy management.

Post Baccalaureate Certificate in Accounting
This certificate is available to students who have a baccalaureate degree and are continuing their education in accounting. Completion of the certificate will allow students to meet the requirements for admission to the Certified Public Accountant (CPA) exam and prepare them for a variety of career paths including CPA and Certified Management Accountant (CMA).

Required Courses (32 credits)
ACC 320 Cost Accounting I  4
ACC 331 Intermediate Accounting I  4
ACC 332 Intermediate Accounting II  4
ACC 333 Intermediate Accounting III  4
ACC 405 Accounting Information Systems  4
ACC 411 Income Tax Procedures  4
ACC 431 Advanced Accounting I  4
ACC 435 Auditing  4

Elective Courses (Choose at least 15 credits from the following courses)
ACC 321 Cost Accounting II  4
ACC 325 Finance  4
ACC 412 Corporate Taxation  4
ACC 432 Advanced Accounting II  4
ACC 465 Case Studies in Accounting  4
BUS 226 Business Law  3
BUS 345 Fraud Examination  3
MIS 312 Systems Analysis I  4

Note: At least 36 credits must be taken at Oregon Tech.
Manufacturing and Mechanical Engineering and Technology Department

Jeffrey Hayen, Department Chair
Steve Edgeman, Program Director, Undergraduate Manufacturing Engineering Technology
Joe Stuart, Program Director, Graduate Manufacturing Engineering Technology
John-Glen Swanson, Program Director, Mechanical Engineering
David Culler, Program Director, Mechanical Engineering Technology
Wangping Sun, Program Director, Wilsonville Programs

Brian Moravec, Interim Program Director, Seattle-Boeing Programs

Professors: D. Culler, N. Mead, B. Moravec, R. Shih, L. Wolf
Associate Professors: I. Demeshko-Prosnik, Y. Gao, J. Hayen, J. Stuart, W. Sun
Assistant Professors: S. Edgeman, D. Lee, S. Sloan, J-G. Swanson

Degrees Offered
Master of Science in Manufacturing Engineering Technology
Bachelor of Science in Manufacturing Engineering Technology
Bachelor of Science in Mechanical Engineering
Bachelor of Science in Mechanical Engineering Technology

Program Mission Statement
The Manufacturing Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in Manufacturing Engineering Technology.

Program Educational Objectives
Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech’s Manufacturing Engineering Technology Program are to produce graduates who:

- are able to analyze and design practical mechanical and manufacturing systems.
- communicate effectively and work well on team-based engineering projects.
- succeed in entry-level manufacturing engineering positions.
- pursue continued professional development.

Career Opportunities
Manufacturing Engineering graduates will find a wide range of opportunities for employment in manufacturing design, research and development, testing, educational institutions, consulting and business. Manufacturing Engineering Technology also prepares students for further study in graduate school. In today’s engineering environment, manufacturing engineers are often called upon to perform a wide range of tasks, from designing and purchasing manufacturing equipment to improving and troubleshooting the manufacturing process. Manufacturing engineers are involved in the design and continuous improvement of products, manufacturing equipment and production tooling. The Manufacturing Engineering curriculum provides education in a variety of areas including manufacturing process, robotics and automation, industrial controls, manufacturing tool design, computer aided design and manufacturing, engineering materials, manufacturing planning and quality control. Technical Electives allow the student flexibility in developing technical breadth or focus in their areas of interest.

Bachelor Program Objectives
The objective of the Manufacturing Engineering Technology undergraduate program is to offer the student a quality education that provides the greatest possible opportunity for rewarding and successful careers. This includes practical training and technical education in engineering, manufacturing processes, and manufacturing equipment as well as supplemental coursework in communications, mathematics, science, social science, and business.

Master Program Objectives
The objective of the graduate program in Manufacturing Engineering Technology is to offer students an advanced level of education that will help them to be successful in their professional career. This includes the theoretical and practical training in manufacturing systems, design for manufacturability, development of lean enterprise, quality engineering, computer-aided manufacturing, project management and information systems. The master’s degree is also available online to students meeting the admission requirements for the program. There are no residency requirements for this degree. The same degree requirements apply to the online program.

Student Preparation
Students planning to enter the Manufacturing Engineering Technology Program are strongly encouraged to take mathematics and science training in high school. In addition, courses such as drafting, CAD, computer skills, and industrial arts will prove beneficial.
Cooperative Education Program
Students in the bachelor of science degree program have an opportunity to work in industry for a specified time and receive college credit. They are encouraged to meet with the Manufacturing Engineering Technology Undergraduate Program Director. MFG students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: https://mecopinc.org.

Accreditation
The Bachelor of Science in Manufacturing Engineering Technology is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., http://www. abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements—Master of Science
The Master of Science in Manufacturing Engineering Technology requires completing 45 credit hours of graduate work, with at least 30 credit hours of graduate coursework from the following four Curriculum Content Areas (CCAs):
1. Engineering Science and Design Technology
2. Manufacturing Software and Computer Integration
3. Advanced Manufacturing Materials and Processes Technology

In addition to the 30 CCA credit hours, students must complete 12 credits toward thesis or 9 credits toward an approved project and three credits in graduate seminars. Students must take at least one course in each of the four CCAs and three courses in at least one CCA. All graduate courses are three credits each. See Master’s student advisor to complete an academic plan.

Degree Requirements
The Bachelor of Science in Manufacturing Engineering Technology requires completing 192 credit hours, as prescribed in the following curriculum outline. Several of these courses are titled manufacturing elective, and allow the student some flexibility to pursue specific career objectives within the manufacturing engineering field. Upper-division manufacturing engineering technology courses not specifically required for graduation, as well as selected upper-division mechanical engineering technology courses and other approved courses, may be used as manufacturing electives. Students should contact their advisor for specific details as to which courses qualify as manufacturing electives. In order to satisfy the engineering science elective, the student must complete one of the following courses: Engineering Mechanics: Dynamics (ENGR 212), Fluid Mechanics (MET 218), or Thermodynamics (ENGR 355). In order to satisfy the business/management restricted elective the student must complete one of the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461, or MGT 462.

Bachelor of Science in Manufacturing Engineering Technology Curriculum
Required courses and recommended terms during which they should be taken:

Freshman Year

Fall
ENGR 111 MMET Orientation 2
MATH 111 College Algebra 4
WRI 121 English Composition 3

Winter
CHE 101 Introduction to General Chemistry 3
CHE 104 Introduction to General Chemistry Laboratory 1
MATH 112 Trigonometry 4
MET 241 CAD for Mechanical Design I 2
MFG 120 Manufacturing Processes I 4
WRI 122 Argumentative Writing 3

Total 15

Sophomore Year

Fall
MATH 251 Differential Calculus 4
MFG 112 Introduction to Manufacturing Processes 3

Winter
ENGR 211 Engineering Mechanics: Statics 4
MATH 361 Statistical Methods I 4
MFG 112 Introduction to Manufacturing Processes 3

Total 17

Junior Year

Fall
ENGR 213 Engineering Mechanics: Strength of Materials 4
ENGR 236 Fundamentals of Electric Circuits 3
ENGR 266 Engineering Computation 3
MATH 362 Statistical Methods II 4
WRI 227 Technical Report Writing 3

Winter

Total 17
Junior Year  Fall
MET 315  Machine Design I  3
MET 360  Engineering Materials II  3
MET 375  Solid Modeling  3
MFG 313  Manufacturing Analysis and Planning  3
MFG 341  Numerical Control Programming  3
Total  15

Junior Year  Winter
MET 316  Machine Design II  3
MET 326  Electric Power Systems  3
MFG 333  Statistical Methods for Quality Improvement  3
MFG 342  Computer Aided Machining  3
MFG 343  Manufacturing Tool Design  3
Humanities/Social Science Elective1  3
Total  18

Senior Year  Fall
ANTH 452  Globalization  3
MFG 453  Automation and Robotics in Manufacturing  3
MFG 454  Thermal Systems for Manufacturing  3
MFG 461  Senior Project I  3
WRI 327  Advanced Technical Writing  3
MFG Elective2  3
Total  18

Senior Year  Winter
MFG 462  Senior Project II  3
B US/MGT Restricted Elective*  3
Humanities/Social Science Elective1  3
MFG Elective5  3
MFG Elective5  3
Total  15

Senior Year  Spring
ENGT 415  Occupational Safety  3
MFG 447  Lean Manufacturing  3
MFG 463  Senior Project III  3
MGT 345  Engineering Economy  3
MFG Elective5  3
Total  15

1 – Select 9 credits of Humanities electives and 9 credits of Social Science electives. ANTH 452 fulfills the remaining credits needed to satisfy the 12 credits of Social Science courses for the Baccalaureate general education requirements.

2 – ENGT 230, 231, 232 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and 213 requirements.

3 – Select one course from the following list: ENGR 212 (Dynamics), ENGR 555 (Thermodynamics), or MET 218 (Fluid Mechanics).

4 – Select either ENGR 445 (Engineering Project Management) or MGT 335 (Project Management).

5 – Consult with an academic advisor or program director regarding available and appropriate MFG elective courses. MECH and MET electives are also acceptable.

6 – Select one course from the following list: BUS 226, 304, or 335; MGT 321, 461, or 462.

Total credits required for B.S. in Manufacturing Engineering Technology: 192

Concurrent Degree

The Mechanical and Manufacturing Engineering Technology Department provides the opportunity for the interested student to earn concurrent degrees in Manufacturing Engineering Technology (MFG) and Mechanical Engineering Technology (MET) or Mechanical Engineering (MECH). Students who earn both degrees are highly sought after and have been very successful in industry. The concurrent degree program usually requires the student to complete an additional year of study beyond the Bachelor's Degree in Mechanical Engineering or Mechanical Engineering Technology.

Fall
MFG 313  Manufacturing Analysis and Planning  3
MFG 341  Numerical Control Programming  3
MFG 453  Automation and Robotics in Manufacturing  3
B US/MGT Restricted Elective*  3
Manufacturing Elective***  3
Total  18

Winter
MFG 112  Introduction to Manufacturing Processes**  3
MFG 333  Statistical Methods for Quality Improvement  3
MFG 342  Computer Aided Machining  3
MFG 343  Manufacturing Tool Design  3
B US/MGT Restricted Elective*  3
Manufacturing Elective***  3
Total  18

Spring
ENGT 415  Occupational Safety  3
MFG 447  Lean Manufacturing  3
MFG 447  Lean Manufacturing  3
MATH 362  Statistical Methods II  4
Total  13

* Restricted Elective from the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461 or MGT 462.

** This course is already required for the BSMET degree.

*** These courses must be different than those used to satisfy the BS degree in MET or MECH. In all cases the student must have at least 36 credits of additional coursework beyond the MET or MECH degree to qualify for the concurrent degree in MFG.
Mechanical Engineering

**Degree Offered**
Bachelor of Science in Mechanical Engineering

**Program Mission Statement**
The Mechanical Engineering Program at Oregon Institute of Technology is an applied engineering program. Its mission is to provide graduates the skills and knowledge for successful careers in mechanical engineering.

**Program Educational Objectives**
Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing alumni to achieve.

The program expects graduates to achieve, within several years of graduation, the following objectives. Mechanical Engineering graduates will have:

- demonstrated the ability to analyze, design and improve practical thermal and/or mechanical systems.
- shown the ability to communicate effectively and work well on team-based engineering projects.
- succeeded in entry-level mechanical engineering positions regionally and nationally.
- pursued continued professional development, including professional registration, if desired.
- successfully pursued engineering graduate studies and research, if desired.

**Career Opportunities**
Mechanical Engineering is the broadest branch of engineering providing graduates the ability to pursue many varied career paths. It encompasses a wide variety of specialties including alternative energy, mechanical design, thermal/fluids/heat transfer, and mechatronics to name a few. Graduates will find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The Mechanical Engineering degree also prepares the student for further study in graduate school.

**Objectives of the Program**
The Mechanical Engineering Program at Oregon Institute of Technology provides an excellent theoretical and applied or hands on engineering education. The program provides graduates with a foundation in fundamentals, applications, design, project management, communications, and professional and ethical responsibility.

The program offers coursework in all of the above areas beginning with mathematics, science, machining, welding, and computer aided design topics in the freshman year. Engineering science and physics courses are typically taken by the student in the sophomore year. Junior and senior curriculum is devoted to analysis, design, and testing aspects of mechanical engineering. Technical electives are available for students to pursue their particular fields of interest.

Throughout the four-year curriculum, emphasis is placed on oral and written communication skills, teamwork and cooperation, and hands on laboratory and project work. Graduates are well-rounded engineers and readily accepted into industry or graduate programs.

**Student Preparation**
Students planning to enter the Mechanical Engineering curriculum should undertake Mathematics/science training in high school. Such courses as algebra, trigonometry, calculus, physics, chemistry, drafting, CAD, writing, speech, and shop classes will prove beneficial.

**Cooperative Field Experience**
There is an opportunity for students in the Bachelor of Science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Program Director. Mechanical Engineering students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: https://mecopinc.org.

**Accreditation**
The Mechanical Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.
Degree Requirements
In the curriculum listings appear several courses titled "MECH Elective." MECH electives allow the student to select and pursue specific career objectives within the mechanical engineering field. MECH electives are upper-division MECH courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled "Transfer Students" and "Admission to Baccalaureate Programs."

The Bachelor of Science in Mechanical Engineering requires 192 credit hours as prescribed in the following curriculum outline.

Bachelor of Science in Mechanical Engineering Curriculum
Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
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<td>ENGR 111</td>
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<td>WRI 121</td>
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<tr>
<td>Humanities/Social Science Elective&lt;sup&gt;1&lt;/sup&gt;</td>
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</tr>
<tr>
<td>College Algebra (if suggested by advisor)&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>MECH 315</td>
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<tr>
<td>Fluid Mechanics II Requirement&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
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<td>MATH 254N</td>
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<td>Statistics Requirement&lt;sup&gt;5&lt;/sup&gt;</td>
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<td>ENGR 236</td>
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<td>ENGR 266</td>
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<td>MATH 321</td>
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<td>MECH 318</td>
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<td>MECH 363</td>
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<tr>
<td>MET 375</td>
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<td>MFG 314</td>
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</table>

Total Credits Required for B.S. in Mechanical Engineering: 192

1 – Along with HUM 125, PHIL 331, and an Economics course, another 3 credits of Humanities courses and 9 credits of Social Science courses. Furthermore, activity or performance-based Humanities courses are not accepted.

2 – MATH 111 (College Algebra) and MATH 112 (Trigonometry) should be taken if needed to adequately prepare for MATH 251. Any credits earned from these courses do not apply to the degree program. Consult with an academic advisor for further guidance.
Mechanical Engineering Technology

Degree Offered
Bachelor of Science in Mechanical Engineering Technology

Program Mission Statement
The Mechanical Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in mechanical engineering and manufacturing.

Program Educational Objectives
Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Mechanical Engineering Technology Program are to produce graduates who:

- are able to analyze and design practical mechanical systems.
- communicate effectively and work well on team-based engineering projects.
- succeed in entry-level mechanical and manufacturing engineering positions.
- pursue continued professional development.

Career Opportunities
Mechanical Engineering Technology graduates find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The largest number of graduates are employed by manufacturing firms. There, the graduates may develop new products, improve existing products, modify existing products for easier manufacture, or develop equipment for use in the production process. The work done by Mechanical Engineering Technologists varies widely. Interfacing computers and machines is a rapidly growing area of employment. This involvement with robotics and automation is having an impact on most mechanical systems. New materials such as high strength ceramics and polymers, fiber reinforced plastics, and new bonding agents are growing in importance and their applications will offer many interesting and fulfilling careers. Energy systems become increasingly important as energy costs rise. Aerospace firms employ many Oregon Tech graduates in design, testing, and manufacturing. Careers in such traditional areas as power plants, heating and cooling systems, gas and steam turbines, and automotive systems are within the domain for the Mechanical Engineering Technologist.

Objectives of the Program
The objective of the Mechanical Engineering Technology Program is to ensure that graduates of this curriculum acquire competency in those theoretical, applied engineering and practical subjects necessary to become successful in their careers. The program strives to maintain a reputation for academic standards that will assure graduates a welcome by prospective employers.

Student Preparation
Students planning to enter the Mechanical Engineering Technology curriculum should undertake mathematics-science training in high school. Such courses as algebra, geometry, trigonometry, physics, chemistry, drafting, CAD, English, writing, speech, and shop classes will prove beneficial.

Cooperative Field Experience
There is an opportunity for students in the bachelor of science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Technology program director. MET students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: https://mecopinc.org.

Accreditation
The Mechanical Engineering Technology Program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., http://www.abet.org. ABET is a specialized accrediting board rec-

3 – Select either MATH 361 (Statistical Methods I) or MATH 465 (Mathematical Statistics). MATH 465 is required for students who are pursuing a minor field of study in Applied Mathematics.

4 – Consult with an academic advisor or program director regarding available and appropriate MECH elective courses. MET and MFG electives are not acceptable.

5 – Select either MECH 417 or MECH 418, depending upon which course is currently offered.
# Bachelor of Science in Mechanical Engineering Technology

## Curriculum

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 101/201 Chemistry</td>
<td>3</td>
<td>MATH 251 Differential Calculus</td>
</tr>
<tr>
<td>CHE 104/204 Chemistry Laboratory</td>
<td>1</td>
<td>MFG 120 Mfg Processes I</td>
</tr>
<tr>
<td>ENGR 111 Mmet Orientation</td>
<td>2</td>
<td>SPE 111 Public Speaking</td>
</tr>
<tr>
<td>MATH 113 College Algebra</td>
<td>4</td>
<td>Humanities Elective</td>
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<td>WRI 121 English Composition</td>
<td>3</td>
<td>WRI 227 Technical Report Writing</td>
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<td><strong>Total</strong></td>
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<tr>
<th>Sophomore Year</th>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 211 Engineering Mechanics: Statics</td>
<td>4</td>
<td>PHY 201/221 General Physics</td>
</tr>
<tr>
<td>MATH 254 Vector Calculus I</td>
<td>4</td>
<td>WRI 227 Technical Report Writing</td>
</tr>
<tr>
<td>MET 242 CAD for Mechanical Design I</td>
<td>2</td>
<td><strong>Total</strong></td>
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<tr>
<td>MFG 112 Introduction to Manufacturing Processes</td>
<td>3</td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>PHY 202/222 General Physics</td>
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<tr>
<th>Junior Year</th>
<th>Fall</th>
<th>Winter</th>
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<tbody>
<tr>
<td>ENGR 266 Engineering Computation</td>
<td>3</td>
<td>ENGR 355 Thermodynamics</td>
</tr>
<tr>
<td>MET 315 Machine Design I</td>
<td>3</td>
<td>MET 316 Machine Design II</td>
</tr>
<tr>
<td>MET 360 Engineering Materials II</td>
<td>3</td>
<td>MET 375 Solid Modeling</td>
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<tr>
<td>MET 363 Engineering Instrumentation</td>
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<td>Social Science Elective</td>
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<thead>
<tr>
<th>Senior Year</th>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>MET 492 Senior Projects III</td>
<td>3</td>
<td>MFG 351 Industrial Controls</td>
</tr>
<tr>
<td>MATH 321 Applied Differential Equations I</td>
<td>4</td>
<td>Humanities Elective</td>
</tr>
<tr>
<td>MET 490 Senior Projects I</td>
<td>3</td>
<td>MET Elective</td>
</tr>
<tr>
<td>MGT 345 Engineering Economy</td>
<td>3</td>
<td>Social Science Elective</td>
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<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

| Total credits required for B.S. in Mechanical Engineering Technology: 191 |

1 – PSY 201 is highly recommended.
2 – ENGT 230, 231, 232 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and 213 requirements.
3 – MET 232 (when offered) may be alternatively taken to satisfy the ENGR 355 requirement.
4 – Select either ENGR 445 (Engineering Project Management) or MGT 335 (Project Management).
5 – Consult with an academic advisor or program director regarding available and appropriate MET elective courses. MECH and MFG electives are also acceptable.
Applied Mathematics Department

Tiernan Fogarty, Department Chair
Jim Ballard, Scheduling Coordinator
Randall Paul, Advising Coordinator and Program Director
Christina Negoita, Curriculum Coordinator
Professors: J. Fischer, C. Negoita, T. Thompson
Associate Professors: J. Ballard, T. Fogarty, R. Paul, T. Torres, G. Waterman
Assistant Professors: J. Reid, D. Deb, D. Hammond

General Education
Courses offered by the Department of Applied Mathematics are designed to satisfy the needs of majors and non-majors interested in mathematics primarily as part of a broad technical education. A major emphasis is on development of skills required to solve applied problems.

Success in mathematics requires that entering students begin their study in the course which best matches their ability and background. Accordingly, all entering students must pass a placement examination at the appropriate level before being allowed to register for their initial mathematics course.

Degree Offered
Bachelor of Science in Applied Mathematics

Minor Offered
Applied Mathematics
Applied Statistics

Program Objectives
Coursework for the bachelor’s degree is intended to provide a solid foundation of mathematical theory and a broad selection of applied work both in and outside mathematics. The prospective major will complete coursework in calculus, differential equations and numerical methods. Students also take a sequence of introductory physics courses and a further sequence in a technical field outside mathematics.

Career Opportunities
Upon completing the requirements for the Applied Mathematics degree students will be prepared for a variety of jobs in industry including numerical modeling, signal processing, data analysis, and many others. The degree also provides students a sufficient background to further their education by entering a Masters or Ph.D. program in Mathematics or Applied Mathematics.

Student Preparation
Students entering the Applied Mathematics Program from high school should have a minimum of two years of algebra, one year of pre-calculus, one year of geometry, and two years of physical science (physics or chemistry preferred). Additional courses in mathematics, science, English and computer programming will be very helpful. Students entering the Applied Mathematics Program by transfer are requested to contact the Mathematics Department concerning transfer of technical course work.

Degree Requirements
In addition to the mathematics requirements listed below, students will be required to complete the 200 level calculus-based general physics sequence as well as other general education requirements and Electives necessary to bring the total credit hours to 182. Please see the recommended curriculum map below.

All mathematics courses must be completed with a grade “C” or better. Transfer students should consult the Admissions Office and the Mathematics Department to determine which of their courses will satisfy Oregon Tech course requirements.

Lower-Division Required Courses
(18 credits)
MATH 221 Introduction to Computational Software
MATH 251 - MATH 254N Calculus Sequence

Upper-Division Core Requirements
(43 credits)
MATH 311 Introduction to Real Analysis
MATH 321-322 Applied Differential Equations I, II
MATH 327 Discrete Mathematics
MATH 341 Linear Algebra I
MATH 354 Vector Calculus II
MATH 361 Statistical Methods I
MATH 421 Applied Partial Differential Equations I
MATH 451 Numerical Methods I

Plus two additional courses chosen from:
MATH 422 Applied Partial Differential Equations II
MATH 423 Applied Partial Differential Equations III
MATH 452 Numerical Methods II
MATH 453 Numerical Methods III

Upper-Division Math/Physics Electives
(At least 7 credits)
Students will choose 2 upper-level mathematics or physics courses with the approval of a mathematics advisor. No more than 3 credits can be MATH 407.

Focused Electives (16 credits)
Students will choose appropriate electives from outside of mathematics. These courses should support the program objectives and must be approved by a mathematics advisor. The focused electives must total at least 16 credits at least 9 of which are from a 3 course sequence; see below for examples.

Examples of Focused Elective Sequences
• CST 116, 126, 223 Programming Languages
• CHE 221, 222, 223 General Chemistry
• ENGR 211, 212, 213 Engineering Mechanics: Statics, Dynamics, Strength of Materials
• PHY 311, 312, 313 Introduction to Modern Physics

Examples of Focused Electives
• CHE 331, 332, 333 Organic Chemistry
• ENGR 318 Engineering Mechanics: Fluids
• ENGR 236 Fundamentals of Electric Circuits
• PSY 361 Industrial Psychology
• RDSC 356 Magnetic Resonance

Notes:
1. Some of the above courses have an additional lab requirement.
2. PHY 221, 222, 223 may not be used as focused electives.
Bachelor of Science in Applied Mathematics
Curriculum
Required courses and recommended terms during which they should be taken:

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<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Winter</th>
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<tbody>
<tr>
<td>MATH 251</td>
<td>Differential Calculus</td>
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<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
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<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<td>Social Science Elective</td>
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<tbody>
<tr>
<td>MATH 252</td>
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<td>PHY 221</td>
<td>General Physics with Calculus</td>
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<td>WRI 122</td>
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<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
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<td>MATH 327</td>
<td>Discrete Mathematics</td>
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<td>PHY 223</td>
<td>General Physics with Calculus</td>
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<tbody>
<tr>
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<td>Linear Algebra I</td>
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<td>MATH 354</td>
<td>Vector Calculus II</td>
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<tbody>
<tr>
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<td>Applied Differential Equations I</td>
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<tr>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
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<tr>
<td>MATH 311</td>
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<tbody>
<tr>
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<td>MATH 451</td>
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<td>Applied Partial Differential Equations I</td>
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<tr>
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<tbody>
<tr>
<td>MATH</td>
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<tr>
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<th>Junior Year</th>
<th>Spring</th>
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<tbody>
<tr>
<td>MATH</td>
<td>Mathematics Core (upper-division) ***</td>
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<tr>
<td>WRI 327</td>
<td>Advanced Technical Writing</td>
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<td>WRI 350</td>
<td>Documentation Development</td>
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* Students will choose at least 16 credits from outside of mathematics with the approval of a mathematics advisor. At least 9 credits should be from a 3 course sequence. See above for examples.
** Students will choose 2 upper-division courses from mathematics or physics with the approval of a mathematics advisor.
*** See “Upper-Division Core Requirements” listed above in the degree requirements section. The years and terms that these courses are offered will vary. For questions about availability, please consult with an advisor or contact the Mathematics Department.

Total credits required for B.S. in Mathematics: 182

Applied Mathematics Minor
The minor in Applied Mathematics provides formal recognition of mathematical proficiency. It is composed of a core of required courses and upper-division electives related to the student’s major. The minor consists of 29 credits, 19 from required courses and 10 from elective courses.

This minor is open to all majors and is especially recommended for students with an interest in pursuing a career related to mathematics. It will enhance their employability and improve graduate school possibilities.

Curriculum
1. Required courses: MATH 251, MATH 252, MATH 253N, MATH 254N and MATH 341, plus 10 additional upper-division mathematics credits selected from the list below.
2. A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor.
3. At least 12 credits must be taken at Oregon Tech.

Students are required to consult an advisor from the Mathematics Department to select upper-division mathematics courses that would be most applicable to their major and/or career goals.

Upper-Division Electives:
- MATH 311 Introduction to Real Analysis
- MATH 321 Applied Differential Equations I
- MATH 322 Applied Differential Equations II
- MATH 323 Discrete Mathematics
- MATH 342 Linear Algebra II
- MATH 346 Number Theory
- MATH 347 Fundamentals of Abstract Algebra
- MATH 354 Vector Calculus II
- MATH 362 Statistical Methods II
- MATH 421 Applied Partial Differential Equations I
- MATH 422 Applied Partial Differential Equations II
- MATH 423 Partial Differential Equations III
- MATH 451 Numerical Methods I
- MATH 452 Numerical Methods II
- MATH 453 Numerical Methods III
- MATH 465 Mathematical Statistics

Note: Not all courses are offered every term or every year.
Applied Statistics Minor

The Minor in Applied Statistics is open to students in all majors and is specifically recommended for those students who wish to pursue graduate school or work in research. Students pursuing the minor will have enhanced statistical skills and a deeper understanding of statistics than what is received in one or two introductory courses. A minimum of 18 credits is required to complete this minor, 8 credits from required courses and 10 credits from elective courses.

Curriculum list

1. A minimum of 18 credits (all earned with grade of “C” or above) is required to earn the minor.
2. Required courses: MATH 361 and MATH 362 (Statistical Methods I and II). In addition, at least 10 more credits of upper-division courses are needed from the lists below. Note that at least 4 credits of those must come from MATH/STAT courses listed below.
3. At least 12 credits must be taken at OIT.

Students are advised to consult an advisor from the Mathematics Department of select upper-division mathematics courses that would be most applicable to their major and/or career goals.

Courses

Upper-Division MATH/STAT Electives (at least 4 credits)
- MATH 465: Mathematical Statistics
- STAT 413: Categorical Data Analysis
- STAT 431: Sampling Methods
- STAT 412: Regression and Time Series
- STAT 415: Design and Analysis of Planned Experiments

Additional Courses (at most 6 credits)
- BIO 434: Data Analysis Methods
- BUS 456 or 457: Business Research Methods I or II
- COM 326: Communication Research
- GME 444: Adjustment by Least Squares
- MFG 333: Statistical Methods for Quality Improvement
- MGT 461, 462 or 463: Lean Management I, II or III
- PSY 313 or 314: Psychological Research Methods I or II

Note: Not all courses are offered every term or every year.
Medical Imaging Technology Department

Debbie McCollam, Department Chair
Robyn Cole, Diagnostic Medical Sonography Program Director
Barry Canaday, Echocardiography Program Director
Don McDonnell, Radiologic Science Program Director
Chris Caster, Vascular Technology Program Director
Richard Hoylman, Nuclear Medicine Technology Program Director and Clinical Coordinator
Tara Guthrie, Echocardiography Clinical Coordinator
Jenny Kellstrom, Radiologic Science Clinical Coordinator
Bobbi Kowash, Diagnostic Medical Sonography Clinical Coordinator
Leah Jolly, Vascular Technology Clinical Coordinator
Janette Isaacson, Vascular Technology and Echocardiography Degree Completion Program Director
Gary Zimmerman, Radiologic Science Degree Completion Program Director
Robyn Cole, Diagnostic Medical Sonography Degree Completion Program Director

Professors: J. Kellstrom, D. McCollam, T. McVay, S. Schultz, G. Zimmerman
Associate Professors: C. Caster, R. Cole, R. Hoylman
Assistant Professors: B. Canaday, D. McDonnell, R. Carson
Instructors: V. Bennett, M. Breedlove, T. Guthrie, B. Kowash, S. Templeton

Participating Faculty: J. Isaacson (Online Education)
Participating Faculty: M. Benson (Online PACS)

Degrees Offered
Bachelor of Science in Diagnostic Medical Sonography
Bachelor of Science in Echocardiography
Bachelor of Science in Nuclear Medicine Technology
Bachelor of Science in Radiologic Science
Bachelor of Science in Vascular Technology

Specialization Offered
Picture Archiving and Communication Systems (PACS)

Department Objectives
The objectives of the Medical Imaging Technology Program are:
1. To prepare students to become effective participants in the medical imaging professions.
2. To provide the residents of Oregon and the Pacific Northwest with Bachelor of Science degrees in Medical Imaging Technology.
3. To prepare students for professions that require critical-thinking and problem solving skills.
4. To instill an effective influence of professional character, the knowledge and experience to pass the National Registry exams.
5. To instill lifelong learning.

Accreditation
Oregon Institute of Technology is accredited by Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

Program Descriptions
The Department of Medical Imaging Technology offers bachelor’s degrees in five professional programs, which encompass the spectrum of imaging sciences. The curriculum of each bachelor’s degree program provides the technical, scientific, and communication skills essential for the application of learned concepts. Each program prepares students for immediate employment and for successfully passing the national and state registry examinations in each field.

Diagnostic Medical Sonography: (also called sonography, ultrasound, or general ultrasound). Sonography uses high frequency sound wave imaging and Doppler instrumentation to aid in the diagnosis of pathology and disease processes. The sonographer gathers pertinent patient history, creates images, and submits preliminary findings to the reading physician. Common exams include: obstetric, gynecological, peritoneal, retroperitoneal, pelvic, thoracic, musculoskeletal, extremity, neurological, and superficial procedures. Invasive applications are also performed in most clinical settings.

Echocardiography
Echocardiography is a safe method of obtaining ultrasound images for diagnosis of cardiac pathology in adult and pediatric patient populations. Echocardiographers perform imaging exams that include acquisition of detailed images of heart anatomy, evaluation of pathologies, and measurement/analysis of hemodynamic flow patterns within the heart and the heart’s major vessels. The Echocardiographer prepares the study images and reports pertinent findings to the interpreting cardiologist as part of the diagnostic process.

Nuclear Medicine Technology
Nuclear medicine is an imaging science that demonstrates pathology through physiologic processes, as opposed to detailed anatomic images. This branch of imaging science has been in existence for over four decades, and provides unique diagnostic information obtained by the patient’s ingestion, inhalation, or being injected with a radioactive isotope.

Radiologic Science
This program has been in existence at Oregon Tech for more than 50 years. The training prepares the future radiologic technologist with a wide variety of skills, including radiography, fluoroscopy, mobile and surgical radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Mammography, Cardiovascular Interventional Technology (CIT), Quality Assurance, and imaging department management.

Vascular Technology
Vascular technology is a profession which utilizes ultrasound, Doppler, color Doppler and various physiologic testing procedures to aid in the diagnosis of disease of the vascular system. Vascular technologists conduct patient interviews, compile health histories and determine risk assessments pertaining to vascular disease. The technologists choose appropriate testing modalities and provide referring physicians with preliminary interpretation of results.
Facilities
Oregon Tech’s state-of-the-art imaging equipment allows medical imaging students to become familiar with a wide variety of imaging procedures like those performed in most medical centers. Students may also spend significant time at Sky Lakes Medical Center where they will gain experience directly with patients, prior to externship. This experience plus the academic coursework prepares the student well for the medical imaging profession.

Externships
All five of the bachelor’s degree programs in medical imaging culminate in a senior year of clinical externship at a medical center. The 11-month externship is spent at the affiliate institution under the supervision of a clinical instructor. Students do not have classes on the Oregon Tech campus during this year. The location of externship will be determined by a lottery conducted by medical imaging faculty. All students will be guaranteed an externship subject to the following:

1. All academic requirements must be met before externship assignments will be made.
2. Students must satisfy Oregon requirements for clinical placement as listed in Oregon Administrative Rules (OAR 409-030-0100 to 409-030-0250).

Upon successful completion of the externship year, imaging students will be eligible to sit for the professional registry pertaining to their degree.

Admission Requirements
Pre-Medical Imaging Technology: Freshman Year
Enrollment is open to all students who meet the general entry requirements to the university. Students will be listed as Pre-Medical Imaging Technology (Pre-MIT) students. Admittance to the Oregon Tech Pre-MIT Program does not mean the student has been accepted into a specific MIT program.

Program Selection Criteria
Selection criteria are available on the MIT website at www.oit.edu/mit. Students must complete all the courses, including general education, in the specified freshman year (pre-medical imaging) curriculum. Selection will be made at the end of the spring term of the pre-medical imaging technology year. The number of students selected each year will be determined by the number of qualified applicants, and by the availability of clinical sites. Therefore, the number of qualified applicants may exceed the number of spaces available. Prior acceptance does not guarantee future acceptance into any MIT Program. Students must reapply yearly.

Selection will be based upon the following criteria and point system:
1. **GPA**: Students must have a total of a 2.75 weighted GPA (though a 3.0 or higher is highly recommended), in the following courses (or equivalent transfer courses) to apply to one of the five MIT Programs.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 111 College Algebra</td>
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</tr>
<tr>
<td>MATH 112 Trigonometry</td>
<td>4</td>
</tr>
<tr>
<td>MIT 103 Introduction to Medical Imaging</td>
<td>3</td>
</tr>
</tbody>
</table>

GPA points are calculated as GPA x 10. (For example, a 3.5 GPA x 10 = 35). To determine how to calculate weighted GPA, see website at www.oit.edu/mit.

2. All applicants must attend an Oregon Tech hosted selection event at the end of spring term. Several activities are conducted during this event to allow students to demonstrate communication skills, writing skills, and professionalism.

Faculty from the MIT Department and industry leaders are present at the selection event to evaluate those skills.

Application Requirements
Applications are available on the MIT website at www.oit.edu/mit.

Applications are due spring term. Incomplete applications will not be accepted. An application fee of $75 is required. There are no refunds of the application fee. Repeat applicants must follow the same procedures as first-time applicants.

The application form allows ranking of programs by choice (first and second) and only one application per student will be accepted. If multiple applications are received, they will be returned along with the application fees.

Transfer Students
Transfer students who meet the academic requirements of the pre-medical imaging technology year, will not find a course at another college which substitutes for MIT 103 Introduction to Medical Imaging. This course may be taken as a distance learning course. It must be completed in the summer, fall, winter or spring term prior to the application to a professional program. The MIT application is available at www.oit.edu/mit. Transfer students must apply to both Oregon Tech and MIT using two separate application processes.

Graduation Requirements
All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled.

Students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of “C” or better must be earned in all professional courses (DMS, ECHO, NMT, RDSC, VAS), and science/mathematics courses to continue in the program. A final grade of “C” or better must be also earned in all required communications courses by the end of the junior year to continue on in the program. Once the student is admitted into a professional program as a sophomore, all curricular requirements must be met within four academic years. Rare exceptions to the time limitation will be considered on a case by case basis, at the discretion of the re-admittance committee described below.

When a student unsuccessfully attempts a programmatic course fall term, sophomore
year, they must reapply to the program or another imaging program. If the student has an unsuccessful attempt subsequent to fall term sophomore year the student must submit a letter of intent to the program director of the specific program they seek to re-enter. The MIT re-admittance committee will determine if another opportunity will be granted. If re-admittance is approved additional requirements will be prescribed by the MIT committee.

Other requirements such as auditing courses, attending labs, and/or remedial work will be specified by the committee. The student must remain in compliance with committee’s recommendations and requirements to satisfy degree progress. When a student attempts unsuccessfully a second time in the same or a different programmatic course, they are terminated from that program. Additionally, if a student receives a “D,” “F” or “W” in two or more programmatic courses in one term, they will be dismissed from that program. The student may apply for admittance to a second imaging program under the same application criteria as other applicants. After two unsuccessful attempts to complete two different programs, the student may not apply for a third program.

Career Opportunities
There continues to be a high demand for bachelor’s degree prepared medical imaging professionals. Graduates have excellent opportunities for employment in hospitals, clinics, private practice, state and federal agencies, and with appropriate experience, in supervision, education and industry.

Bachelor of Science in Diagnostic Medical Sonography

Curriculum
Required courses and recommended terms during which they should be taken:

Pre-Medical Imaging Technology

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<thead>
<tr>
<th>Freshman Year</th>
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<tbody>
<tr>
<td>BIO 231</td>
<td>Human Anatomy and Physiology I</td>
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<tr>
<td>CHE 101</td>
<td>Introduction to General Chemistry</td>
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<td>CHE 104</td>
<td>Introduction to General Chemistry Laboratory</td>
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<td>MATH 111</td>
<td>College Algebra</td>
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<td>MIT 103</td>
<td>Introduction to Medical Imaging</td>
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<td>BIO 232</td>
<td>Human Anatomy and Physiology II</td>
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<td>Trigonometry</td>
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<td>BIO 200</td>
<td>Medical Terminology</td>
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<td>BIO 233</td>
<td>Human Anatomy and Physiology III</td>
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<td>PSY</td>
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<td>WRI 122</td>
<td>Argumentative Writing</td>
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Professional Courses

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<tr>
<td>BIO 335</td>
<td>Cross-Sectional Anatomy</td>
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<tr>
<td>DMS 223</td>
<td>Applications of Abdominal Sonography I *</td>
<td>3</td>
</tr>
<tr>
<td>DMS 252</td>
<td>Sophomore Laboratory I *</td>
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<tr>
<td>PHY 217</td>
<td>Physics of Medical Imaging</td>
<td>3</td>
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<tr>
<td>Humanities Elective</td>
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<tr>
<td>Social Science Elective</td>
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<tbody>
<tr>
<td>DMS 224</td>
<td>Applications of Abdominal Sonography II *</td>
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</tr>
<tr>
<td>DMS 235</td>
<td>Diagnostic Medical Sonography Patient Care*</td>
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</tr>
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<td>DMS 253</td>
<td>Sophomore Laboratory III *</td>
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<tr>
<td>MIT 231</td>
<td>Sonographic Principles and Instrumentation I *</td>
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</tr>
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<td>WRI 227</td>
<td>Technical Report Writing</td>
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<tbody>
<tr>
<td>DMS 225</td>
<td>Applications of Abdominal Sonography III *</td>
<td>3</td>
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<tr>
<td>DMS 234</td>
<td>Pelvic Sonography *</td>
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<td>DMS 254</td>
<td>Sophomore Laboratory III *</td>
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<td>MIT 232</td>
<td>Sonographic Principles and Instrumentation II *</td>
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<tr>
<td>Social Science Elective</td>
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Junior Year

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<thead>
<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>DMS 346</td>
<td>Musculoskeletal Sonography</td>
</tr>
<tr>
<td>DMS 352</td>
<td>Junior Laboratory I *</td>
</tr>
<tr>
<td>DMS 365</td>
<td>Sonographic Pathology *</td>
</tr>
<tr>
<td>DMS 337</td>
<td>Breast Sonography</td>
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<tr>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
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Junior Year

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<tbody>
<tr>
<td>BUS Elective (BUS 316, BUS 317, or BUS 313)</td>
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</tr>
<tr>
<td>DMS 316</td>
<td>Survey of Vascular Technology *</td>
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<tr>
<td>DMS 342</td>
<td>Survey of Adult Echocardiography *</td>
</tr>
<tr>
<td>DMS 353</td>
<td>Junior Laboratory II *</td>
</tr>
<tr>
<td>DMS 370</td>
<td>Obstetrical Sonography</td>
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Junior Year

<table>
<thead>
<tr>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>DMS 343</td>
<td>Fetal Echo, Neonatal, and Pediatric Sonography *</td>
</tr>
<tr>
<td>DMS 354</td>
<td>Junior Laboratory III *</td>
</tr>
<tr>
<td>DMS 373</td>
<td>Obstetrical Pathology *</td>
</tr>
<tr>
<td>DMS 388</td>
<td>Externship Preparation *</td>
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Senior Year

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<tr>
<th>Summer</th>
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<tbody>
<tr>
<td>DMS 430</td>
<td>Diagnostic Medical Sonography Externship *</td>
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Senior Year

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<tr>
<td>DMS 430</td>
<td>Diagnostic Medical Sonography Externship *</td>
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Senior Year

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<tbody>
<tr>
<td>DMS 430</td>
<td>Diagnostic Medical Sonography Externship *</td>
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</table>

* Core Imaging Courses
** Courses listed under Communication requirements for General Education.

Total credits required for B.S. in Diagnostic Medical Sonography 192
Bachelor of Science in Echocardiography

Curriculum

Required Courses and recommended terms during which they should be taken:

### Pre-Medical Imaging Technology

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* Core Imaging Courses
** Courses listed under Communication requirement for General Education.

Total credits required for B.S. in Echocardiography: 195

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Bachelor of Science in Nuclear Medicine Technology

Curriculum

Required courses and recommended terms during which they should be taken:

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Bachelor of Science in Radiologic Science Curriculum

Required courses and recommended terms during which they should be taken:

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* Core Imaging Courses
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Total credits required for B.S. in Nuclear Medicine Technology: 192

Pre-Medical Imaging Technology

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<td>BIO 335 Cross-Sectional Anatomy</td>
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<td>RDSC 233 Contrast Media Procedures</td>
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<td>BIOC 336 Essentials of Pathophysiology</td>
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Total credits required for B.S. in Radiologic Science: 199
Bachelor of Science in Vascular Technology Curriculum

Required courses and recommended terms during which they should be taken:

### Pre-Medical Imaging Technology

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<tr>
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<tbody>
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<td>VAS 246</td>
<td>Peripheral Arterial Disease*</td>
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<td>VAS 335</td>
<td>Radiographic Vascular Anatomy*</td>
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<td>VAS 225</td>
<td>Patient Management Practices*</td>
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<td>VAS 245</td>
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<td>Survey of Abdominal Sonography*</td>
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<tr>
<th>Senior Year</th>
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<td>VAS 420</td>
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* Core Imaging courses
** Courses listed under Communication requirement for General Education.

Total credits required for B.S. in Vascular Technology: 197

### Picture Archiving and Communication Systems (PACS) Specialization

Medical Imaging Technology students with an interest and aptitude in computer science have a unique opportunity at Oregon Tech. With the availability of Computer Systems and Management Information Systems majors at Oregon Tech, a specialization in Picture Archiving and Communication Systems (PACS) is available for motivated students to pursue this opportunity.

### Requirements of the Specialization

- MIT 209 PACS I: Intro to Picture Archiving Communications Systems | 3 |
- MIT 219 PACS II: PACS Communication and Administration | 3 |
- MIT 229 PACS III: PACS Technical Requirements and Image Quality | 3 |
- MIT 239 PACS IV: PACS Implementation and System Management | 3 |
- MIT 249 PACS V: DICOM | 3 |
- MIT 259 PACS VI: PACS Security | 3 |

Students must earn a “C” or better in all courses to be awarded the specialization.
Degree Completion Programs
The Diagnostic Medical Sonography, Echocardiography, Radiologic Science and Vascular Technology programs offer degree completion programs for registered technologists (in good standing) who wish to pursue a bachelor’s degree in their field. These programs are fully online. There is no requirement to come to campus.

Bachelor’s Degree Completion: Diagnostic Medical Sonography
Courses granted for Registry
DMS 223 Applications of Abdominal Sonography I 3
DMS 224 Applications of Abdominal Sonography II 3
DMS 225 Applications of Abdominal Sonography III 3
DMS 234 Pelvic Sonography 3
DMS 235 Diagnostic Medical Sonography Patient Care 3
DMS 252 Sophomore Laboratory I 1
DMS 253 Sophomore Laboratory II 1
DMS 254 Sophomore Laboratory III 1
DMS 370 Obstetrical Sonography 3
DMS 388 Externship Preparation (waived) 0
DMS 430 Diagnostic Medical Sonography Externship 45
MIT 103 Introduction to Medical Imaging 3
MIT 231 Sonographic Principles and Instrumentation I 4
MIT 232 Sonographic Principles and Instrumentation II 4
PHY 217 Physics of Medical Imaging 3
Total 80

Oregon Tech Degree Completion Credits
BIO 335 Cross-Sectional Anatomy 3
BUS 313 Health Care Systems & Policies 3
or
BUS 316 Total Quality in Health Care 3
or
BUS 317 Health Care Management 3
DMS 316 Survey of Vascular Technology * 3
DMS 337 Breast Sonography 3
DMS 342 Survey of Adult Echocardiography 3
DMS 343 Fetal Echo, Neonatal and Pediatric Sonography 3
DMS 346 Musculoskeletal Sonography 3
DMS 352 Junior Laboratory I 1
DMS 353 Junior Laboratory II 1
DMS 354 Junior Laboratory III 1
DMS 355 Sonographic Pathology 3
DMS 373 Obstetrical Pathology 3
DMS 430A Diagnostic Medical Sonography Externship 8
DMS 430B Diagnostic Medical Sonography Externship 7
SPE 321 Small Group and Team Communication 3
SPE 322 Communication Elective 3
Total 51

Transfer Courses
BIO 200 Medical Terminology 2
BIO 231 Human Anatomy and Physiology I 4
BIO 232 Human Anatomy and Physiology II 4
BIO 233 Human Anatomy and Physiology III 4
CHE 104 Introduction to General Chemistry Laboratory 1
MATH 111 College Algebra 4
MATH 112 Trigonometry 4
PSY 217 Psychology (PSY 201, PSY 202, PSY 203) 3
WRI 212 Argumentative Writing 3
WRI 213 Technical Report Writing 3
WRI 227 Social Science Electives 9
Total 61

* Credits may be granted for additional specialty registry exams. Please contact Program Director for more information.

Bachelor’s Degree Completion: Echocardiography
Courses granted for Registry
BIO 220 Cardiovascular Physiology 4
BIO 346 Pathophysiology I 3
BIO 347 Pathophysiology II 3
ECHO 225 Cardiopulmonary Patient Management Practices 3
ECHO 231 Echocardiography I 3
ECHO 232 Echocardiography II 3
ECHO 320 Cardiographic Methods 3
ECHO 321 Stress and Transesophageal Echo 3
ECHO 333 Echocardiography III 3
ECHO 420 Echocardiography Externship 45
WRI 212 Argumentative Writing 3
WRI 227 Technical Report Writing 3
Total 90

Oregon Tech Degree Completion Courses
BUS 313 Health Care Systems & Policies 3
or
BUS 316 Total Quality in Health Care 3
or
BUS 317 Health Care Management 3
CHE 360 Clinical Pharmacology for the Health Professions 3
ECHO 325 Pediatric Echocardiography * 3
ECHO 332 Invasive Cardiology 3
ECHO 334 Echocardiography IV 4
ECHO 365 Abdominal/Renal Testing 4
ECHO 376 Survey of Vascular Testing * 3
ECHO 385 Echocardiography Laboratory Management 3
ECHO 420A Echocardiography Externship 4
ECHO 420B Echocardiography Externship 7
ECHO 421 Echo Senior Project 4
SPE 321 Small Group and Team Communication 3
Total 89

Oregon Tech Degree Completion Courses
BIO 335 Cross-Sectional Anatomy 3
BIO 336 Essentials of Pathophysiology 3
BUS 313 Health Care Systems & Policies 3
or
BUS 316 Total Quality in Health Care 3
or
BUS 317 Health Care Management 3
RDSC 326 Cardiovascular/Interventional Technology * 4
RDSC 354 Mammmography * 4
or
RDSC 365 Advanced Quality Assurance/Quality Control 4
RDSC 355 Computed Tomography 4
RDSC 356 Magnetic Resonance 4
RDSC 366 Radiologic Pathology 3
RDSC 411 Special Radiologic Science Externship 15
SPE 321 Small Group and Team Communication 3
Communication Elective 3
Total 49

* Optional credit may be awarded for additional registries.

Transfer Courses
BIO 200 Medical Terminology 2
BIO 231 Human Anatomy and Physiology I 4
BIO 232 Human Anatomy and Physiology II 4
BIO 233 Human Anatomy and Physiology III 4
CHE 101 Introduction to General Chemistry 3
CHE 104 Introduction to General Chemistry Laboratory 1
MATH 111 College Algebra 4
MATH 112 Trigonometry 4
PSY Psychology (PSY 201, PSY 202 or PSY 203) 3
SPE 111 Public Speaking 3
WRI 121 English Composition 3
WRI 122 Argumentative Writing 3
WRI 227 Technical Report Writing 3
Humanities Electives 9
Social Science Electives 9
Elective 2
Total 61

* Optional credit may be awarded for additional registries.

Bachelor's Degree Completion: Vascular Technology
Courses granted for Registry
BIO 346 Pathophysiology I 3
BIO 347 Pathophysiology II 3
MIT 103 Introduction to Medical Imaging 3
MIT 231 Sonographic Principles and Instrumentation I 4
MIT 232 Sonographic Principles and Instrumentation II 4
PHY 217 Physics of Medical Imaging * 3
VAS 214 Vascular Anatomy 4
VAS 225 Patient Management Practices 3
VAS 245 Peripheral Venous Disease 4
VAS 246 Peripheral Arterial Disease 4
VAS 367 Cerebrovascular Disease 4
VAS 420 Vascular Technology Externship 45
Total 84

Oregon Tech Degree Completion Credits
BIO 220 Cardiovascular Physiology 4
BUS 313 Health Care Systems & Policies 3
or
BUS 316 Total Quality in Health Care 3
or
BUS 317 Health Care Management 3
CHE 360 Clinical Pharmacology for the Health Professions 3
SPE 321 Small Group and Team Communication 3
VAS 335 Radiographic Vascular Anatomy 3
VAS 337 Survey of Echocardiography 3
VAS 365 Abdominal Vascular Disease 4
VAS 366 Special Circulatory Problems 4
VAS 375 Survey of Abdominal Sonography * 3
VAS 385 Vascular Laboratory Management 3
VAS 420A Special Vascular Technology Externship 8
VAS 420B Special Vascular Technology Externship 7
Communication Elective 3
Total 51

Transfer Courses
BIO 200 Medical Terminology 2
BIO 231 Human Anatomy and Physiology I 4
BIO 232 Human Anatomy and Physiology II 4
BIO 233 Human Anatomy and Physiology III 4
CHE 101 Introduction to General Chemistry 3
CHE 104 Introduction to General Chemistry Laboratory 1
MATH 111 College Algebra 4
MATH 112 Trigonometry 4
PSY Psychology (PSY 201, PSY 202 or PSY 203) 3
SPE 111 Public Speaking 3
WRI 121 English Composition 3
WRI 122 Argumentative Writing 3
WRI 227 Technical Report Writing 3
Humanities Electives 9
Social Science Electives 9
Elective 3
Total 62
Natural Sciences Department

Rosalind McClure, Department Chair

**Professors:** B. Burda, B. Clark, H.-Y. Li, T. McVay, M. O’Shaughnessy, E. Schechtel, R. Swisher, K. Usher

**Associate Professors:** R. Wilde, R. McClure

**Assistant Professors:** S. Anthony, M. Beekman, K. Byrne, M. Hughes, J. Kellermann, G. Pak, L. Parratt, E. Taylor

**Degrees Offered**
- Bachelor of Science in Biology-Health Sciences
- Bachelor of Science in Environmental Sciences

**Minor Offered**
- Applied Physics
- Biology
- Chemistry
- Sustainability

The Department of Natural Sciences prepares students for challenging, rewarding careers in health, biological, and environmental sciences. The department also provides courses in biology, chemistry, and physics in support of degrees in nursing, medical imaging, dental hygiene, respiratory care, management and engineering programs.

Biology Program

Many students have an interest in biology. At Oregon Tech we have designed two programs that prepare graduates for rewarding careers that require a strong foundation in biology. For outdoor or field-oriented options, please refer to the Environmental Sciences program in our department. It offers several emphases including Watershed Science, that can readily be tailored to biological interests and student research projects. Graduates from our Environmental Sciences program often go on to careers with public and private agencies such as US Fish and Wildlife Service, US Forest Service and the Nature Conservancy. For medically-oriented options in biology, please see our Biology-Health Sciences program. It offers a strong preparation to apply to professional programs, exceeding the minimum requirements for highly competitive fields such as Medicine, Pharmacy, Dentistry, Veterinary Medicine, Physician Assistant, and others.

Biology-Health Sciences Program

Ken Usher, Program Director

**Degree Offered**
- Bachelor of Science in Biology-Health Sciences

**Objective and Career Opportunities**
If you are interested in pre-medical, pre-dental, pre-veterinary, pre-pharmacy, pre-physical therapy, etc., then this is the major you want. The degree program provides an intensive course of study in the basic sciences, social sciences, communication, and mathematics to prepare students for entry into professional programs. The program will meet prerequisite requirements for schools of medicine, dentistry, veterinary medicine, osteopathic medicine, optometry, pharmacy, and podiatry and for graduate programs in physical therapy and occupational therapy. Courses in health management, medical microbiology, biochemistry, and molecular & cell biology also provide strong preparation for graduate work in biotechnology, public health, and medical administration. This major can also prepare one for a career in education with an emphasis in biology.

**Student Preparation**
The Biology-Health Sciences curriculum is a demanding instructional program requiring considerable effort in science and mathematics coursework. Prospective students are advised to complete two to three years of high school mathematics and a minimum of three years of high school science (biology, chemistry, and physics).

**Degree Requirements**
The minimum graduation requirement is 181 credit hours of prescribed coursework. Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain a Bachelor of Science degree in Biology-Health Sciences. Biology-Health Sciences students must complete every science course with a minimum grade of "C" and must maintain a minimum grade point average of 2.5 in lower division science courses to advance to upper-division science courses in the major.

Because the prerequisite requirements and recommended courses for entry into health professions and graduate schools differ, some upper-division courses may be substituted for others, with approval of your academic advisor.
# Bachelor of Science in Biology-Health Sciences

## Curriculum

Required courses and recommended terms during which they should be taken:

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<td>PHY 222 General Physics with Calculus (upper-division) 4</td>
<td>Health Biology Elective (lower-division) 2</td>
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<td>CHE 221 General Chemistry I 5</td>
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Total credits required for B.S. in Biology-Health Sciences: 181

Footnotes:

1. MATH 243 may be substituted with advisor consent.
2. Minimum of 2 credits of lower-division health biology elective must be completed, chosen from the lower-division list above. Alternately, an additional elective from the upper-division list may be taken, in which case a total of at least 23 credits of upper-division health biology electives are required.
3. Minimum of 21 credits of upper-division health biology electives must be completed, chosen from the upper-division list above.
4. MATH 243 may be substituted with advisor consent.
5. Advisor approval of all elective choices is required. Additional courses from the health biology lists above, and/or suitable courses from BUS, MATH, or PSY are recommended.

When choosing electives or substituting courses, students are responsible for completing a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300 and 400 level classes at a bachelor's degree granting institution.
Pre-Professional Program in Dentistry

Burt Clark, Advising Coordinator

The pre-professional program in dentistry prepares the student for entrance into dental school. While the requirements for admission to dental schools vary and some will accept students earlier, a bachelor's degree is highly encouraged for acceptance. In fact, 82% of first-year dental students have completed a four-year baccalaureate degree before starting dental school and 90% have four years of pre-dental college courses before acceptance. The curriculum at Oregon Institute of Technology provides the prerequisite courses for dental school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses.

Because the pre-dental requirements for each dental school vary slightly, it is suggested by sophomore year of college that students look at the requirements for several dental schools along with their dream school. It is also recommended that students do not use AP credit to fill prerequisites for dental school since most do not accept them. There are eight advisors in Oregon Tech's pre-dental program and it is encouraged that students work closely with the advisor they connect best with. The Biology-Health Sciences Program also urges students to begin volunteering in dental settings, possibly during high school and especially during college. For students still in high school, it is advisable to enroll in many sciences courses before college to help prepare for future success.

Admission to dental school is very competitive and requires strong academic achievement. Besides a strong college GPA and application, students must take the dental admission test (DAT) offered by the American Dental Association. The test measures a student's comprehension of scientific information and academic ability. Once accepted, it will take approximately four years to complete dental school.

For complete program requirements and a list of appropriate courses, please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

Pre-Professional Program in Medicine

Burt Clark, Advising Coordinator

This program prepares students for entrance into medical school and is often referred to as pre-med. The curriculum at Oregon Institute of Technology provides a pathway to complete all the prerequisites that medical schools like to see and more. There are eight advisors in the pre-med program and students are encouraged to work closely with the advisor they connect best with. Advisors guide students on courses selection, job or volunteer experience, and lead them through the medical school application process. Admission into medical school requires a four-year bachelor's degree with a preference for a science major over a non-science major. Once accepted, medical school then requires approximately four years of education and three to six years of internship and residency. More than 17,000 students enter medical school each year with half of the class being women.

Students are urged to volunteer in medical settings, possibly during high school and especially during college. For students currently in high school, it is advised that the student enrolls in many sciences courses before college to help them prepare for future success. It is recommended that students do not use AP credit to fill medical school prerequisites since they often do not accept them. Nonetheless, it is encouraged to take AP courses in high school since the rigor is excellent college preparation.

Students considering a career in medicine should explore the websites of the schools they have interest in as the prerequisites for each may vary. Students are suggested to read the Medical School Admissions Requirements (MSAR) published by the Association of American Medical Colleges. The pre-med program at Oregon Tech includes a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses.

The pre-professional program in pharmacy at Oregon Tech has eight advisors and students are encouraged to work closely with the advisor they connect best with. Students are urged to begin volunteering in pharmacy settings, possibly during high school and especially during college. For students currently in high school, it is recommended to shadow and talk with pharmacists and to take many science courses before college to help prepare.
for future success.

The application process to pharmacy school is done through the Pharmacy College Application Service (PharmCAS). Students are encouraged to look at their web site while also looking at the sites of schools they have an interest in. Some pharmacy schools require the Pharmacy College Admissions Test (PCAT). Oregon State University and the pharmacy schools in California do not. Admission to school is competitive so a strong undergraduate GPA, community service, and communications and leadership skills will help.

For complete program requirements and a list of appropriate courses please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

Pre-Professional Program in Veterinary Medicine

Burt Clark, Advising Coordinator

The pre-professional program in veterinary medicine prepares students for entrance into veterinary school. There are twenty-eight veterinary schools in the United States and it is highly recommended that students visit the websites of the schools they are interested in. The prerequisites for each school vary slightly. There are eight advisors in the program and students should work closely with the advisor they connect best with.

Admission to veterinary school is competitive and requires a good undergraduate GPA in addition to shadowing or working with a veterinarian. Students are encouraged to work in a clinical practice, volunteer in an animal shelter, or work at a zoo or rehabilitation facility while completing their undergraduate courses. Students currently in high school should continue to take sciences courses and, if available, be involved in 4H or FFA. Advisors recommend that students do not use AP credit to fill prerequisites for veterinary school since most do not accept them.

Being a resident of a state that has a veterinary school is also a major advantage to being accepted since most schools take few out-of-state applicants. If the student’s home state does not have a veterinary school, hopefully the state “buys” seats from a veterinary school in a neighboring state for its residents. The WICHE program in the western United States allows out-of-state students to attend veterinary school at Colorado State University at Fort Collins, Oregon State University, Washington State University or the University of California at Davis veterinary schools for in-state tuition.

Many veterinary schools require students to take the general test of the Graduate Record Examination (GRE). It is offered monthly and is often taken in the junior year of undergrad. The majority of first-year veterinary student have completed their bachelor’s degree at a four-year university.

The program at Oregon Institute of Technology offers the prerequisite courses (and more) for veterinary school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in wildlife rehabilitation, cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, English composition and public speaking courses. Business-related courses are also recommended.

For complete program requirements and a list of appropriate courses please see the Biology—Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology—Health Sciences.

Applied Physics Minor

Students wishing to pursue the minor in Applied Physics should consult with physics faculty in the Natural Sciences Department for advising.

The Minor in Applied Physics is available to any student and is especially recommended for individuals interested in pursuing careers or graduate studies in physical or applied sciences and engineering. The Minor in Applied Physics requires completion of 32 credits of coursework as outlined below. A grade of “C” or better is required in all courses applied toward the minor.

Required Coursework:
1. PHY 221, 222, 223 – General Physics w/ Calculus (12 credits total)
2. MATH 254N – Vector Calculus I (4 credits)
3. MATH 321 – Applied Differential Equations I (4 credits)
4. At least 12 credits of upper-division physics Electives (PHY prefix)

Up to six credits of the upper-division elective coursework may be satisfied by approved non-PHY electives that utilize the technical application of physics (see list below; other courses must be approved by the physics faculty and the chair of the Natural Sciences department on a case-by-case basis). Of the 12 upper-division elective credits, six cannot be counted toward the student’s major program.

Approved Upper-Division Electives:
Any course 300-level or higher that has a PHY prefix.
Examples include:
PHY 311 Introduction to Modern Physics
PHY 330 Electricity and Magnetism
PHY 448 Geometric Optics
PHY 449 Radiometry & Optical Detection
PHY 450 Physical Optics
PHY 451 Lasers
PHY 452 Fiber Optics
PHY 453 Optical Metrology
PHY 410 Mathematical Methods

Approved non-PHY Electives:
EE 341 Electricity and Magnetism with transmission lines
EE 343 Solid State Electronic Devices
REE 344 Nuclear Energy
REE 345 Wind Power
REE 347 Hydroelectric Power
MECH 312 Dynamics II
MECH 318 Fluid Mechanics I
MECH 323 Heat Transfer I
MECH 417 Fluid Mechanics II
MECH 480 Mechanical Vibrations
MECH 313 Thermodynamics II

Note: Not all courses are offered every year or on every campus. Additional prerequisites may be required; see catalog descriptions and recent course schedules for details.

Biology Minor

For advising, see Kerry Byrne

The biology minor is open to all majors except Biology-Health Sciences majors. It is especially recommended for students who want to further their knowledge in biology as it relates to their chosen field. The minor offers specialized courses in biology and will document student proficiency in specific areas of biology. A minimum of 24 credits is required to complete the minor. Any substitution for elective courses must be approved by an
advisor in the Natural Sciences Department. Students are advised to pay strict attention to prerequisites when selecting courses for the biology minor.

Requirements of Minor

Required core courses:
- BIO 211 Principles of Biology
- BIO 212 Principles of Biology
- BIO 213 Principles of Biology

And a minimum of 12 credits upper-division course work from the following list:
- BIO 313 Botany*
- BIO 317 Invertebrate Biology
- BIO 327 General Ecology*
- BIO 331 Human Anatomy and Physiology I
- BIO 332 Human Anatomy and Physiology II
- BIO 333 Human Anatomy and Physiology III
- BIO 337 Aquatic Ecology*
- BIO 341 Medical Genetics
- BIO 342 Cell Biology
- BIO 345 Medical Microbiology
- BIO 351 Vertebrate Biology
- BIO 352 Developmental Biology
- BIO 357 Introduction to Neuroscience
- BIO 426 Evolutionary Biology
- BIO 436 Immunology
  * Courses offered in alternating years.

Chemistry Minor

For advising, see Seth Anthony

Oregon Tech offers a minor in chemistry to students in all majors interested in deepening their knowledge of chemistry, the “central science”. A minor in chemistry allows students the opportunity to gain understanding of chemical phenomena, become proficient in techniques, and develop their abilities applying fundamental chemistry concepts to more complex problems in fields from medicine to renewable energy to materials science. A chemistry minor can help prepare students for graduate school, medical school, or professional laboratory or research work.

The minor includes a required core of one year of general chemistry and one term of organic chemistry. Students must then choose 16 credits of chemistry electives to complete the minor. Of these electives, 12 must be upper-division and at least 8 must be CHE courses. A minimum of 16 credits applied towards the minor must be earned at Oregon Tech.

Students wishing to pursue the minor in chemistry should consult with both their primary academic advisor and a chemistry minor advisor.

Requirements of Minor

Required core courses (17 – 19 credits):
- CHE 201/204 or CHE 221 General Chemistry I
- CHE 202/205 or CHE 222 General Chemistry II
- CHE 223, CHE 203/206 or General Chemistry III
- CHE 331 Organic Chemistry I

Elective courses (16 credits required; at least 12 must be upper division (300-level or higher) and at least 8 must be CHE courses) At least 6 elective credits must not be counted towards a major (or another minor or program) as required courses or technical electives.
- CHE 260 Electrochemistry for Renewable Energy Applications
- CHE/ENGR/PHY 305 Nanotechnology
- CHE 315 Environmental Chemistry and Toxicology
- CHE 332 Organic Chemistry II
- CHE 333 Organic Chemistry III
- CHE 450 Biochemistry I
- CHE 451 Biochemistry II
- CHE 452 Biochemistry III
- CHE 465 Fate and Transport of Pollutants

Other electives approved by the Natural Sciences advisory team

Sustainability Minor

For advising, see Michael Hughes, Environmental Science

The sustainability minor is available to all students in all majors and is recommended for any student who wants to develop sustainability literacy and gain credit for a breadth of study encompassing the three primary cores of sustainability education: natural sciences, humanities and social sciences, and engineering and technology. The minor in sustainability acknowledges the completion of 18 credits as outlined below. Introductory and capstone courses are included and at least one course must be taken in each of the three core areas. At least 12 of the 18 credits must be upper division. Advising for the minor is performed by a primary advisor with support from secondary advisors representing each of the three core areas.

Requirements of Minor

Required core courses (7 credits):
- BIO 484 Sustainable Human Ecology
- SOC 235 Introduction to Sustainability

Elective Courses (At least 11 credits required with at least one course taken from each area: natural sciences, humanities and social sciences, and engineering and technology):

Natural Sciences
- BIO 111 Introduction to Environmental Sciences
- BIO 327 General Ecology
- BIO 337 Aquatic Ecology
- CHE 260 Electrochemistry for Renewable Energy Applications
- CHE 315 Environmental Chemistry and Toxicology
- CHE 465 Fate and Transport of Pollutants
- ENV 265 Field Methods in Environmental Sciences
- ENV 314 Environmental Management and Restoration
- ENV 325 Wetland and Riparian Ecology
- ENV 336 Environmental Hydrology
- ENV 365 Advanced Field Methods in Environmental Sciences
- ENV 427 Greenhouse Gas Accounting/Footprints
- ENV 469 Treatment Wetlands
- GEOG 106 Physical Geography
- GEOG 305 Geomorphology
- GEOG 315 Climatology
- GEOG 335 Soil Science
- Other courses as approved by the advisory team

Humanities and Social Sciences
- ANTH 335 The Built Environment
- ANTH 452 Globalization
- COM 205 Inter-cultural Communication
- COM 365 Electronic Communication and Society
- ECO 357 Energy Economics and Policy
- GEOG 106 Cultural Geography I
- GEOG 107 Cultural Geography II
- GEOG 108 Cultural Geography III
- HIST 225 The Industrial Revolution
- HIST 226 Technology and the Modern World
- HIST 356 A History of Energy
- HIST 357 History of the Electric Grid
- HUM 125 Introduction to Technology, Society and Values
- PHIL 331 Ethics in the Professions
- PHIL 342 Business Ethics
- PSY 334 Behavior Modification I
- Other courses as approved by advisory team

Engineering and Technology
- BUS 385 Ecotourism
- BUS 415 Environmental Regulation
- BUS 416 Environmental Management
- CE 405 Sustainability and Infrastructure
- CE 457 Transportation and Land Development
- CE 481 Environmental Engineering I
CE 489  Treatment Wetlands
CE 586  Environmental Engineering II
GIS 134  Geographic Information Systems
GIS 103  The Digital Earth
MET 416  Energy Systems
REE 201  Introduction to Renewable Energy
REE 253  Electromechanical Energy Conversion
REE 331  Fuel Cells
REE 346  Biofuels and Biomass
REE 427  Greenhouse Gas Accounting/Footprints
Other courses as approved by the advisory team
Environmental Sciences Program

Michael Hughes, Program Director
John Ritter, GIS Emphasis Coordinator

Degree Offered
Bachelor of Science in Environmental Sciences

Dual Major Options
Bachelor of Science in Civil Engineering and Environmental Sciences

Advising Coordinator: David Thaemert

Bachelor of Science in Renewable Energy Engineering and Environmental Sciences

Advising Coordinator: James Zipay

The Bachelor of Science degree in Environmental Sciences emphasizes the application of scientific reasoning and methodology to problems concerning: (1) environmental processes and patterns, and/or (2) abiotic-biotic interactions in ecosystems. Methodological training focuses on techniques—and instrumentation—in conjunction with GIS and geospatial analysis.

The program rests on three cores: a core of six lower-division courses in introductory environmental science, a basic sciences core of nine courses (one year each of biology, chemistry and physics), and a mathematics core of five courses, including differential and integral calculus and statistics. The program is by definition interdisciplinary and utilizes the practical knowledge and skills of faculty from a broad range of backgrounds and expertise.

Students may choose to concentrate in one of four technical emphasis areas; Watershed Science, Sustainable Technologies, Geographic Information Systems (GIS) and Biological Resources. Under the direction of an advisor, students may forego any one area and instead blend offerings from all four areas to create a more individually focused curriculum. The emphasis in Watershed Science focuses on the structure, processes, patterns, ecology, management, and restoration of terrestrial, riparian and aquatic ecosystems. Special attention is granted to the flows of energy and materials through these ecosystems, as well as human impacts on ecosystem functions. The emphasis in Sustainable Technologies focuses on the characterization of environmental processes and patterns for application to the management, planning, and development of renewable resources, with special attention to water and renewable energy. The emphasis in GIS builds on the GIS core curriculum to advance student knowledge and skills in the application of geospatial concepts and technologies to problems in environmental sciences and natural resource management.

The emphasis in Biological Resources...

The core curriculum and technical emphasis areas are supported by courses taught by faculty in the Natural Sciences Department and other departments and programs on campus, including Geomatics, Civil Engineering, Renewable Energy Engineering, Mathematics, Humanities and Social Sciences, and Communication Studies.

Objectives
The objectives of the Environmental Sciences Program are:
1. To provide students with knowledge and training in the practical application of scientific reasoning and methodology to problems in environmental science and natural resource management.
2. To present complex environmental problems from a systems perspective that demands rigorous data acquisition and analytical techniques.
3. To provide exercises that support critical thinking and problem-solving skills, encourage student collaboration, and employ multiple methodological approaches.
4. To prepare students for professional careers and/or graduate studies by nurturing meaningful undergraduate research projects as a fundamental curricular element.

Student Preparation
The Environmental Sciences curriculum is a demanding instructional program requiring the development and use of both qualitative and quantitative analytical perspectives and skills. Prospective students for this program are advised to complete two to three years of high school mathematics and science (biology, chemistry, and physics). Students should also be familiar with computer applications. Students transferring from other science or technical programs, including environmental programs at other institutions, are requested to contact the program director for information on program requirements.

Career Opportunities
Graduates can expect to find employment in, among other places, consulting firms, government agencies (regulatory and research), non-governmental organizations (NGOs), and education and research institutions. Students are also well prepared to enter graduate school. Environmental Sciences students at Oregon Tech have been actively recruited by the U.S. Geological Survey, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, Oregon State Police Wildlife Enforcement, Klamath County Health Department, Klamath Irrigation District, Klamath County Soil and Water Conservation District, the Nature Conservancy, and JELD-WEN Windows and Doors. Vocational placement of recent graduates has been excellent and many Environmental Sciences majors find part-time or summer employment directly related to their studies and career interests.

Degree Requirements
Students must meet the general education requirements, as stated elsewhere in this catalog, and complete the courses listed in the curriculum to obtain a Bachelor of Science in Environmental Sciences. A total of 184 credits are required for the degree. Students are encouraged to develop a technical emphasis area based on their own interests. The sophomore year provides an opportunity for independent investigation early in the student's academic career. Students prepare the groundwork for their senior capstone project at the end of the junior year in BIO 473 - Senior Project Data Collection. The project culminates in BIO 474 Senior Project Data Analysis and Presentation – in fall of senior year.

Students are required to pass each science course with a grade of "C" or better. This requirement is based on the quantitative skills needed in later courses as well as the degree of integration in subject material that is present throughout the program.

The Environmental Sciences Curriculum
The Environmental Sciences curriculum integrates “hands-on” skills and knowledge. Field or laboratory work are important components of many ES courses. Several freshman
and sophomore courses allow a student to develop skills in computer applications, Geographic Information Systems (GIS), Global Positioning Systems (GPS), simulation modeling, and riparian assessment methods.

**Bachelor of Science in Environmental Sciences**

**Curriculum**

Required courses and recommended terms during which they should be taken:

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Winter</th>
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</thead>
<tbody>
<tr>
<td>BIO 111</td>
<td>Introduction to Environmental Sciences</td>
<td>4</td>
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<tr>
<td>BIO 211</td>
<td>Principles of Biology</td>
<td>4</td>
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<tr>
<td>GEOG 105</td>
<td>Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>GIS 103</td>
<td>The Digital Earth</td>
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<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<tr>
<th>Freshman Year</th>
<th>Winter</th>
<th>Summer</th>
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<tr>
<td>BIO 212</td>
<td>Principles of Biology</td>
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<tr>
<td>MATH 111</td>
<td>College Algebra</td>
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<tr>
<td>Humanities Elective</td>
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<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
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<th>Sophomore Year</th>
<th>Fall</th>
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<tbody>
<tr>
<td>CHE 221</td>
<td>General Chemistry I</td>
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<tr>
<td>ENV 214</td>
<td>Watershed Science &amp; Technology</td>
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<tr>
<td>MATH 251</td>
<td>Differential Calculus</td>
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<tr>
<td>Technical Emphasis Elective</td>
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<tr>
<th>Sophomore Year</th>
<th>Winter</th>
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<tbody>
<tr>
<td>CHE 222</td>
<td>General Chemistry II</td>
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<tr>
<td>ENV 224</td>
<td>Scientific Reasoning &amp; Methodology</td>
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<td>ENV 261</td>
<td>Sophomore Project Proposal</td>
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<td>GIS 205</td>
<td>GIS Data Integration</td>
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<td>MATH 252</td>
<td>Integral Calculus</td>
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<tr>
<th>Sophomore Year</th>
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<tbody>
<tr>
<td>CHE 223</td>
<td>General Chemistry III</td>
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<tr>
<td>ENV 226</td>
<td>Environmental Data Analysis</td>
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<td>ENV 262</td>
<td>Sophomore Project</td>
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<td>SPE 111</td>
<td>Public Speaking</td>
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<th>Junior Year</th>
<th>Fall</th>
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<tbody>
<tr>
<td>CHE 331</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>PHY 221</td>
<td>General Physics with Calculus</td>
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<tr>
<td>WRI 227</td>
<td>Technical Report Writing</td>
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<td>Humanities Elective</td>
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<td><strong>Total</strong></td>
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**Junior Year**

<table>
<thead>
<tr>
<th>Winter</th>
<th>Summer</th>
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<tbody>
<tr>
<td>ENV 472</td>
<td>Senior Project Proposal</td>
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<tr>
<td>MATH 361</td>
<td>Statistical Methods I</td>
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<tr>
<td>PHY 222</td>
<td>General Physics with Calculus **</td>
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<td>Technical Emphasis Elective</td>
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<td><strong>Total</strong></td>
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<th>Senior Year</th>
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<tbody>
<tr>
<td>BIO 327</td>
<td>General Ecology</td>
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<tr>
<td>BIO 434</td>
<td>Data Analysis Methods</td>
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<tr>
<td>MATH 362</td>
<td>Statistical Methods II</td>
</tr>
<tr>
<td>ENV 473</td>
<td>Senior Project Data Collection</td>
</tr>
<tr>
<td>PHY 223</td>
<td>General Physics with Calculus **</td>
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<tr>
<td><strong>Total</strong></td>
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<table>
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<tr>
<th>Senior Year</th>
<th>Winter</th>
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<tbody>
<tr>
<td>ENV 474</td>
<td>Senior Project Data Analysis and Presentation</td>
</tr>
<tr>
<td>SPE 321</td>
<td>Small Group and Team Communication</td>
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<tr>
<td>Social Science Elective</td>
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<td>Technical Emphasis Elective</td>
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<td>Writing Elective (327,328,350,410)</td>
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<tr>
<th>Senior Year</th>
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<tbody>
<tr>
<td>ENV 314</td>
<td>Environmental Management and Restoration</td>
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<tr>
<td>Social Science Elective</td>
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<tr>
<th>Senior Year</th>
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<tbody>
<tr>
<td>BIO 484</td>
<td>Sustainable Human Ecology</td>
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<tr>
<td>ECO 201</td>
<td>Principles of Economics</td>
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<td>Humanities Elective</td>
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<tr>
<td>Technical Emphasis Elective</td>
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<tr>
<td>Technical Emphasis Elective</td>
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* May be 3 or 4 credits; a total of 31 credits of “technical emphasis” courses are required. At least one technical emphasis elective must be an upper-division chemistry course.

**Total credits required for B.S. in Environmental Science: 184**

1 Sustainable Technologies Emphasis students substitute MET 160 Engineering Materials I.
Select 31 credits from one of the following areas of emphasis:

**Watershed Science Emphasis:**

- **BIO 313** Botany 4
- **BIO 337** Aquatic Ecology 4
- **CHE 315** Environmental Chemistry and Toxicology 3
- **CHE 325** Soil Science 4
- **CHE 352** Organic Chemistry II 4
- **CHE 353** Organic Chemistry III 4
- **CHE 341** Instrumental Methods/Data Acquisition I 4
- **CHE 342** Instrumental Methods/Data Acquisition II 4
- **CHE 455** Water Quality Technology 3
- **CE 374** Hydrology 4
- **CE 473** Groundwater 3
- **ENV 325** Environmental Microbiology 4
- **ENV 336** Environmental Hydrology 4
- **ENV 466** Integrated Watershed Analysis 4
- **ENV 469** Treatment Wetlands 3
- **ENV Elective * varies**
- **GME 161** Plane Surveying I 4

**GIS Emphasis:**

- **ENV ENV Elective * varies**
- **GIS 306** Geospatial Raster Analysis 4
- **GIS 316** Geospatial Vector Analysis I 4
- **GIS 332** Customizing the GIS Environment I 4
- **GIS 426** Geospatial Vector Analysis II 4
- **GIS 432** Customizing the GIS Environment II 4
- **GIS 446** GIS Database Development 4
- **GIS 456** GIS Management 3
- **MIS 115** Visual BASIC Programming 4

**Sustainable Technologies Emphasis:**

- **ANTH 335** The Built Environment 3
- **BUS 304** Engineering Management 3
- **BUS 416** Environmental Management 3
- **CHE 260** Electrochemistry for Renewable Energy Applications 4
- **CE 481** Environmental Engineering 3
- **CE 473** Groundwater 3
- **ENV ENV Elective varies**
- **MET 160** Engineering Materials I 3
- **MET 360** Engineering Materials II 3
- **REE 201** Introduction to Renewable Energy 3
- **REE 331** Fuel Cells 3
- **REE 344** Nuclear Energy 3
- **REE 346** Biofuels and Biomass 3

**Biological Resources Emphasis:**

- **BIO 226** Intro to Wildlife Rehabilitation 3
- **BIO 313** Botany 4
- **BIO 337** Aquatic Ecology 4
- **BIO 342** Cell Biology 4
- **BIO 352** Developmental Biology 4
- **BIO 426** Evolutionary Biology 4
- **CHE 332** Organic Chemistry II 4
- **CHE 333** Organic Chemistry III 4
- **CHE 450** Biochemistry I 4
- **CHE 451** Biochemistry II 4
- **CHE 452** Biochemistry III 4
- **CIV 315** Principles of Environmental Engineering 4
- **ENV 469** Treatment Wetlands 3
- **ENV Elective varies**
- **REE 346** Biofuels and Biomass 3

* ENV 207/307/407, ENV 265, ENV 365, ENV 435, advisor approved independent study, or an upper-division elective from another department with advisor approval. Different ENV 207/307/407 seminars may be taken multiple times for credit.
Nursing – Oregon Statewide Integrated Nursing Program

Susan Bakewell-Sachs Ph.D., R.N., P.N.P.-B.C., F.A.A.N School of Nursing Dean and Vice President for Nursing Affairs for OHSU

Tamara Rose, M.S.N., R.N. Campus Associate Dean

Instructors: M. Boham, M. Gran-Moravec, B. Hunter, T. Ross

This program is offered at Oregon Institute of Technology by the Oregon Health & Science University School of Nursing, in cooperation with Oregon Tech.

Degrees Offered
Bachelor of Science with a major in Nursing

The OHsu School of Nursing is a health professions leader in academic productivity and innovative educational programming. It is recognized as a model in educating students for careers in nursing at both the graduate and undergraduate levels. In July 1993, the Nursing Program at Oregon Tech became a member of the Statewide Integrated Nursing Education System for Oregon. Campuses are located in: Ashland, at Southern Oregon University; Klamath Falls, at Oregon Institute of Technology; La Grande, at Eastern Oregon University; Monmouth, at Western Oregon University; and Portland, at Oregon Health & Science University. In addition to a basic baccalaureate degree in nursing, the statewide program offers opportunities for RNs seeking B.S. degrees.

Non-nursing coursework may be taken at Oregon Institute of Technology, a community college, or other accredited institutions of higher learning. Pre-nursing majors must apply and be accepted by the OHSU School of Nursing in order to progress into the nursing major. Admission is dependent on a point system which includes academic performance and a proctored essay.

The baccalaureate in Nursing Program provides the essential foundation for professional nursing licensure and practice. The Nursing Program, as of fall 2006, includes one year (if courses are begun in summer term, or having transfer credits) or two years of pre-nursing courses and then, after acceptance into the program, three years of professional nursing courses and general courses, as well. Selection into the professional program is competitive.

Nursing courses build upon and complement the liberal arts and science foundation required for professional practice. The graduate of the B.S. program is eligible to complete the registered nursing licensure examination and is prepared to assume responsibility for providing professional nursing care.

Options for Registered Nurses to Obtain a B.S.

There is a process in place for assisting RNs to complete coursework to obtain a B.S. This is an online degree and is not offered on the Oregon Tech campus. Please contact the School of Nursing for information at (866) 223-1811.

Approval and Accreditation

The Nursing Program is approved by the Oregon State Board of Nursing (OSBN) and accredited by the Commission on Collegiate Nursing Education (CCNE) through 2013.

Admission

To be considered for admission to the School of Nursing, a student must submit an online application and official transcripts (www.ohsu.edu/son).

The application process begins October 1 through February 15. The minimum criteria to apply are:

- have 30 credits completed by the end of fall term;
- have completed the Human Anatomy and Physiology I;
- be at the Intermediate Algebra math level;
- have a minimum 3.0 GPA for your prerequisite courses.

Transfer Credits

Transfer credits are accepted subject to review by OHSU Registrar’s office for comparability and number of credits which may be granted.

Requirements for Major

Students with a baccalaureate degree in another discipline should see a nursing advisor for requirements with the nursing major.

Bachelor of Science with a Major in Nursing Curriculum

Courses and terms during which they may be taken.

Pre-Nursing

Freshman Year  
Summer
SPE 111 Public Speaking† 3
WRI 121 English Composition 3
CHE 101 Introduction to General Chemistry † 3
CHE 104 Introduction to General Chemistry Laboratory† 1
MATH 100 Intermediate Algebra* or MATH 243 Intermediate Statistic ** 4
PSY 201 Psychology 3
Total 15

Fall
BIO 231 Human Anatomy and Physiology I 4
CHE 105 Introduction to Organic Chemistry • 3
CHE 106 Introduction to Biochemistry • 1
PSY 311 Human Growth and Development I 3
WRI 122 Argumentative Writing 3
Total 15

Freshman Year  
Winter
BIO 232 Human Anatomy and Physiology II 4
CHE 102 Introduction to Organic Chemistry • 3
CHE 107 Introduction to Biochemistry • 1
PSY 312 Human Growth and Development II 3
Total 14

Spring
BIO 205 Nutrition* 3
BIO 233 Human Anatomy and Physiology III 4
CHE 103 Introduction to Biochemistry* 3
CHE 108 Introduction to Biochemistry • 1
PSY 312 Human Growth and Development II 3
Total 14

* The math competency may be demonstrated by a math placement test or by successful completion of MATH 95/100 Intermediate Algebra or higher.

** Introductory Statistics is a nursing degree requirement.

† SPE 111 is a prerequisite to the third writing (WRI 123 or WRI 227) course which is a degree requirement.

†† SPE 111 is a prerequisite to the third writing (WRI 123 or WRI 227) course which is a degree requirement.

††† SPE 111 is a prerequisite to the third writing (WRI 123 or WRI 227) course which is a degree requirement.
## Professional Courses

### Sophomore Year

**Fall**
- NRS 210A Foundations of Nursing – Health Promotion 4
- NRS 210B Foundations: Practicum 5
- WRI 123 Research Writing
  or
- WRI 227 Technical Report Writing 3
- **Total** 12

### Winter
- BIO 105 Microbiology 4
- NRS 211 Foundations of Nursing in Chronic Illness I 6
- NRS 230 Pharmacology I 3
- NRS 232 Pathophysiology I 3
- **Total** 16

### Spring
- NRS 212 Foundations of Nursing in Acute Care I 6
- NRS 231 Pharmacology II 3
- NRS 233 Pathophysiology II 3
- **Total** 12

### Junior Year

**Fall**
- BIO 235 Human Genetics 3
- NRS 322 Nursing in Acute Care II and End-of-Life 9
- **Total** 12

**Winter**
- MATH 243 Introductory Statistics* 4
- NRS 321 Nursing in Chronic Illness II and End-of-Life 9
- **Total** 13

* MATH 243 may be taken any term.

### Senior Year

**Fall**
- NRS 412 Leadership, Outcome Management in Nursing 10
  Elective varies
- **Total** 10+

**Winter**
- NRS 424 Integrative Practicum I 9
- NRS 424 A-J 1
  Elective varies
- **Total** 10+

**Spring**
- NRS 425 Integrative Practicum II 9
- NRS 425 A-J 1
  Elective varies
- **Total** 10+
Respiratory Care and Sleep Health

Jeff Pardy, Department Chair
Jeff Pardy, Program Director, Respiratory Care
Jane Perri, Program Director, Sleep Health

Polysomnographic Technology

**Degree Offered**
Associate of Applied Science in Sleep Health

**Certificate Offered**
Polysomnographic Technology

Students must successfully complete the core courses required to sit for a national exam. Computer and Internet access is required. Successful completion of the certificate curriculum leads to eligibility to sit for the national Registered Polysomnographic Technologists examination (RPSGT).

**Associate of Applied Science in Sleep Health – Polysomnographic Technology Option**
Students must successfully complete the courses in one of the certificate programs for Polysomnographic Technology or Clinical Sleep Health and other general education courses. The degree completion courses can be taken from Oregon Tech or transferred from another college. A minimum of 30 credit hours must be taken from Oregon Tech. Computer and Internet access are required.

Students who have completed the RPSGT or CCSH exams may pursue a Bachelor of Science in Health Care Management, Clinical Option. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the online education program while working in their hometown. See the Management Department section of this catalog for more information regarding this degree.

**Accreditation**
The Polysomnographic Technology Program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). The curriculum follows the guidelines suggested by the Board of Registered Polysomnographic Technologists. Inquiries regarding accreditation should be directed (CAAHEP). Commission on Accreditation of Allied Health Education Programs, (CoPSG) is a specialized accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S., Department of Education. CAAHEP contact information: 1361 Park Street, Clearwater, FL 33756, Phone: 727-210-2350

**Career Opportunities**
Registered Polysomnographic technologists, under medical direction, conduct diagnostic testing and evaluation of sleep disorder patients. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, out-patient testing facilities and bio-medical equipment manufacturers. Currently, there is a severe nationwide shortage of Registered Polysomnographic Technologists.

**Licensure**
Students are eligible to sit for the national RPSGT exam administered by the Board of Registered Polysomnographic Technologists following the completion of the courses in the certificate program.

**Student Preparation**
A science background is beneficial to those entering any health sciences profession. It is recommended that the student considering a career in Polysomnography take a college bound course of study in high school that includes algebra, chemistry and biology or human anatomy and physiology. It is recommended that students take courses in Microsoft Word, Excel and PowerPoint in high school. Students are required to provide proof of completion either Cardio Pulmonary Resuscitation (CPR) or Basic Cardiac Life Support (BCLS) prior to admission.

**Computer Proficiency Requirement**
Demonstrated computer proficiency is required by the Board of Registered Polysomnographic Technologists to be eligible to sit for the national exam. The PSG Program is an online education program requiring basic computer proficiency to be successful. Successful completion of the program therefore, indicates basic computer proficiency.

**Degree Completion Program**
The associate degree program offers a degree completion program for Registered Polysomnographic Technologists who lack a degree. The courses for this program can be taken through the Online Education Department or in the classroom. Two of the required courses are not available online and must be taken either in the Oregon Tech classroom or a local college and transferred. The communication courses are offered through the online education program of other colleges in the Oregon University System.

Upon receipt of the necessary documentation, specific college credits will be awarded to qualified applicants for having passed the Registered Polysomnographic Technologists examination.

**Clinical Requirements**
All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:
1. Applicants for the certificate program must be high school graduates. If a prospective candidate is not currently employed in a sleep facility, an appropr-
ate site must be found and a clinical agreement between Oregon Tech and that facility must be established prior to beginning classes.
2. Candidates must provide proof of completion of either a Cardio Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.
3. Candidates must submit immunization records prior to their clinical placement.
4. Criminal background clearance is required prior to acceptance and some clinical sites may require drug screening.
5. One full shift of job shadowing is required prior to applying to the program.
6. All Prospective candidates must speak with the program director Dr. Jane Perri (937-750-5416) prior to submitting their application.

Graduation Requirements
Minimum graduation requirements for the A.A.S are the successful completion of 43 credit hours of general education courses and 47 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of “C” or better must be earned in all professional courses (PSG, ECHO, and RCP), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.

In order to prepare for the national registry exam, students are required to participate in a practical exam and a comprehensive written exam at the conclusion of the certificate program. Students are required to come either to Medford Oregon or to Dayton, Ohio for one day of residency. Passage of these exams is required to complete the certificate program. Associate degree students who have already obtained their national licensure are not required to complete this requirement.

Polysomnographic Technology Certificate Curriculum
A certificate will be awarded to students completing 47 credit hours of course work in Polysomnography. This program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). Completion of the certificate will allow the graduate to sit for the national registry exam in Polysomnographic Technology.

Required courses:

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 200</td>
<td>Medical Terminology</td>
<td>2</td>
</tr>
<tr>
<td>ECHO 227</td>
<td>Basic ECG Recognition and Testing</td>
<td>3</td>
</tr>
<tr>
<td>PSG 211</td>
<td>Fundamentals of PSG and Patient Care</td>
<td>3</td>
</tr>
<tr>
<td>PSG 221</td>
<td>Physiology of Sleep</td>
<td>3</td>
</tr>
<tr>
<td>PSG 231</td>
<td>Sleep Disorders Pathology</td>
<td>4</td>
</tr>
<tr>
<td>PSG 246</td>
<td>Sleep Disorders in Women</td>
<td>3</td>
</tr>
<tr>
<td>PSG 264</td>
<td>Pediatric/Neonatal Polysomnography</td>
<td>4</td>
</tr>
<tr>
<td>PSG 271A</td>
<td>Clinical Polysomnographic Technology Part C</td>
<td>6</td>
</tr>
<tr>
<td>PSG 271B</td>
<td>Clinical Polysomnographic Technology Part C</td>
<td>6</td>
</tr>
<tr>
<td>PSG 271C</td>
<td>Clinical Polysomnographic Technology Part C</td>
<td>6</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSG 272</td>
<td>Clinical Polysomnographic Technology I</td>
<td>9</td>
</tr>
<tr>
<td>PSG 273</td>
<td>Clinical Polysomnographic Technology II</td>
<td>9</td>
</tr>
<tr>
<td>PSG 291</td>
<td>Clinical Sleep Educator</td>
<td>3</td>
</tr>
<tr>
<td>RCP 120</td>
<td>Interventions in Gas Exchange</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>47</td>
</tr>
</tbody>
</table>

Demonstrated computer proficiency is required by the Board of RPGST. After completion of the Web-based program, the student will have demonstrated computer proficiency.

The clinical Polysomnographic technology courses require placement in clinical sites. Students are responsible for selecting an accredited sleep disorder facility prior to admission into the program. Site agreements between Oregon Tech and the accredited facility must be in place for the student to begin these courses. On-site preceptors will work in conjunction with Oregon Tech faculty to ensure an excellent training experience.

Associate of Applied Science in Sleep Health, Polysomnographic Technology Option Curriculum
All courses in the Certificate Program and all courses listed below are required to earn the A.A.S degree:

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 231</td>
<td>Human Anatomy and Physiology I</td>
<td>4</td>
</tr>
<tr>
<td>BIO 232</td>
<td>Human Anatomy and Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>BIO 233</td>
<td>Human Anatomy and Physiology III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 243</td>
<td>Introductory Statistics</td>
<td>4</td>
</tr>
<tr>
<td>PSY</td>
<td>Psychology (PSY 201, PSY 202 or PSY 203)</td>
<td>3</td>
</tr>
<tr>
<td>SPE 111</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>WRI 121</td>
<td>English Composition</td>
<td>3</td>
</tr>
<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRI 227</td>
<td>Technical Report Writing</td>
<td>3</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSG 272</td>
<td>Polysomnographic Technology I</td>
<td>9</td>
</tr>
<tr>
<td>PSG 273</td>
<td>Polysomnographic Technology II</td>
<td>9</td>
</tr>
<tr>
<td>PSG 291</td>
<td>Clinical Sleep Educator</td>
<td>3</td>
</tr>
<tr>
<td>RCP 120</td>
<td>Interventions in Gas Exchange</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>43</td>
</tr>
</tbody>
</table>

Total Credit Hours for A.A.S. Degree Sleep Health Polysomnographic Technology Option
Polysomnographic Technology Certificate Courses 47
Additional Courses 43
Total Credit Hours 90
Clinical Sleep Health

**Degree Offered**  
Associate of Applied Science in Sleep Health, Clinical Sleep Health Option

**Certificate Offered in Clinical Sleep Health**  
Students must successfully complete the core courses required to sit for a national exam. Computer and internet access is required. Successful completion of the certificate curriculum leads to eligibility to sit for the national Certified Clinical Sleep Health examination (CCSH).

The program objectives and focus are to provide content knowledge in the following domains: Sleep Over the Lifespan, Clinical Evaluation and Management, Patient and Family Communication and Education; and Program Maintenance and Administration. Successful completion of the certificate curriculum leads to eligibility to sit for the national Certified Clinical Sleep Health examination (CCSH).

**Associate of Applied Science in Sleep Health – Clinical Sleep Health Options**  
Students must successfully complete the courses in the certificate program for Clinical Sleep Health and 46 other general education credits. The degree completion courses can be taken from Oregon Tech or transferred from another college, however at least 30 credits must be taken from Oregon Tech. Successful completion of the two year curriculum leads to eligibility to sit for the national Certified Clinical Sleep Health (CCSH) exam. Computer and Internet access is required.

Students who have completed the CCSH exam may pursue a Bachelor of Science in Health Care Management, Clinical Option. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the online education program while working in their hometown. See the Management Department section of this catalog for more information regarding this degree.

**Accreditation**  
The Clinical Sleep Health Program is accredited under the university accreditation by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. As of this date, Commission on Accreditation of Allied Health Education Programs (CAAHEP) does not have an accrediting body for this degree.

**Career Opportunities**  
Certified Clinical Sleep Health specialists, under medical direction, conduct diagnostic testing, evaluation of sleep disorder patients, patient/community education, compliance certification, status evaluations, and coordination of patient care plans. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, outpatient testing facilities and bio-medical equipment manufacturers.

**Licensure**  
Students are eligible to sit for the national CCSH exam administered by the Board of Registered Polysomnographic Technologists following the completion of the courses in the certificate program.

**Student Preparation**  
The Certificate in Clinical Sleep Health is designed for those who have an approved medical license and at least an associate degree. Applicants must have one of the following credentials to be eligible for admission into the certificate program:

- Polysomnographic Technologist (RPSGT)
- Respiratory Therapist (RRT, CRT)
- Neurodiagnostic Technologist (REEGT, CLTM)
- Health Educator (CHES)
- Nurse (RN, LPN, MSN) or Nurse Practitioner (NP)
- Physician (MD, DO)
- Physician Assistant (PA)
- Dentist (DDS)
- Doctor of Philosophy (PhD) in health, counseling, science

The AAS degree is for those who hold a current license in any of the above areas, but do not have an associate (or higher) degree. Candidates for the national registry exam must hold a minimum of an associate degree.

**Computer Proficiency Requirement**  
The CSH Program is an online education program requiring basic computer proficiency to be successful.

**Clinical Requirements**  
All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:

1. Applicants for the certificate program must be licensed in one of the medical fields listed above and hold at least an associate degree. All prospective candidates must be currently employed in a facility that treats patients with sleep disorders, and the medical director or clinical manager must agree to allow the candidate to complete 400 hours of externship under his or her direction.

2. Candidates must provide proof of completion of either a Cardio-Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.

**Graduation Requirements**  
Minimum graduation requirements for the A.A.S. are the successful completion of 46 credit hours of general education courses and 45 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of “C” or better must be earned in all professional courses (CSH, BUS, and BIO), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.
Clinical Sleep Health Certificate Curriculum
A certificate will be awarded to students completing 45 credit hours of course work in Clinical Sleep Health.

Required courses:

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 200</td>
<td>Medical Terminology</td>
<td>2</td>
</tr>
<tr>
<td>BUS 337</td>
<td>Health Care Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BUS 317</td>
<td>Health Care Management</td>
<td>3</td>
</tr>
<tr>
<td>CSH 201</td>
<td>Human Development and Behavioral Health Modules</td>
<td>3</td>
</tr>
<tr>
<td>CSH 220</td>
<td>Sleep Disorders and Co-Morbidities</td>
<td>3</td>
</tr>
<tr>
<td>CSH 225</td>
<td>Impact of Neurologic Disorders on Sleep</td>
<td>3</td>
</tr>
<tr>
<td>CSH 236</td>
<td>Pharmacology of Sleep</td>
<td>3</td>
</tr>
<tr>
<td>CSH 242</td>
<td>Evaluation and Measurement Tools</td>
<td>3</td>
</tr>
<tr>
<td>CSH 233</td>
<td>Sleep Therapies and Compliance</td>
<td>3</td>
</tr>
<tr>
<td>CSH 268</td>
<td>Learning, Health Literacy, and Community Education</td>
<td>3</td>
</tr>
<tr>
<td>CSH 276</td>
<td>Capstone Project</td>
<td>3</td>
</tr>
<tr>
<td>CSH 277</td>
<td>Clinical Sleep Health Externship (400 contact hours)</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

Associate of Applied Science in Sleep Health, Option: Clinical Sleep Health Curriculum
All courses in the Certificate Program and all courses listed below are required to earn the A.A.S. degree:

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 231</td>
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<td>BIO 233</td>
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<td>WRI 122</td>
<td>Argumentative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRI 227</td>
<td>Technical Report Writing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Math/Science/Social Science Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Humanities Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>46</strong></td>
</tr>
</tbody>
</table>

Total Credit Hours for A.A.S. Degree in Sleep Health, Option: Clinical Sleep Health

Clinical Sleep Health Certificate Courses 45
Additional Courses 46
**Total Credit Hours** 91
Respiratory Care Program

Degree Offered
Bachelor of Science in Respiratory Care

The Bachelor of Science degree program prepares the respiratory care student for entry into the respiratory care profession and eligibility for the National Board for Respiratory Care (NBRC) certificate examination (CRT) and registry examinations (RRT). Upon successful completion of the program, the graduate is eligible to apply for state licensure.

Accreditation
The Respiratory Care Program is fully accredited by the Commission on Accreditation for Respiratory Care (www.coarc.com), 1248 Harwood Rd., Bedford, TX 76021, (817) 283-2835.

Career Opportunities
Registered respiratory therapists are physician extenders who, under medical direction, administer cardiopulmonary care, evaluate and assess pulmonary patients, and administer medications and diagnostic tests when appropriate. Their duties involve the use of many of the latest advances in medical arts, sciences, and technology. Graduates are employed in hospitals, physician’s offices, rehabilitation facilities, home-care agencies and health care promotion centers as caregivers, managers and educators.

Licensure
Students, when applying for licensure, will be asked if they have ever been convicted of a criminal offense, or if they have a history of drug or alcohol abuse. Students with a concern in this area should immediately contact the Oregon Respiratory Therapist Licensing Board (ORTLB) prior to applying to this program.

Program Objectives
Upon completion of the program, graduates will demonstrate:

1. Professional behavior consistent with employer expectations as advanced level respiratory therapists (affective domain).
2. The ability to comprehend, apply and evaluate clinical information relevant to their roles as advanced-level respiratory therapists (cognitive domain).
3. The technical proficiency in all the skills necessary to fulfill their roles as advanced level respiratory therapists (psychomotor domain).

Expected Program Learning Outcomes
Students in the program will demonstrate:

• The ability to communicate effectively in oral, written and visual forms.
• Knowledge of the respiratory care code of ethics and ethical and professional conduct.
• The ability to function effectively as a member of the healthcare team.
• Knowledge and application of mechanical ventilation and therapeutics.
• Knowledge and application of cardiopulmonary pharmacology and pathophysiology.
• Management of respiratory care plans for adult, neonatal and pediatric patients.

Pre-Respiratory Care
Freshman Year
Enrollment is open to all students who meet the general entry requirements to Oregon Institute of Technology. Students will be listed as Pre-Respiratory Care students. Students will be selected into the professional curriculum based on cumulative grade-point average, non-smoking status, performance on an anatomy and physiology test and submission of a technical paper. Alternatively, students may be admitted based upon successful completion of a CoARC accredited associate degree program in respiratory care.

Students are strongly advised to complete all general education courses in the freshman year curriculum before making application to the professional program.

Selections will be made at the end of the spring and summer terms of the Pre-Respiratory Care year. The number of students selected each year will be determined by the availability of clinical sites and other resources, which means that the number of qualified applicants may exceed the number of spaces available. When that is the case, students with the highest cumulative GPA are the first to be offered a position in the program.

Degree Completion Program
The Respiratory Care Program offers a degree completion program for respiratory therapists who wish to pursue a bachelor’s degree in their field. The program is offered online and requires collaborative learning. Admission is based on successful completion of a CoARC accredited associate degree in respiratory care. When students have completed RCP 442 and have submitted documentation of the Registered Respiratory Therapist credential college credit is granted. Students must participate in an orientation. Each prospective student’s academic credits will be individually evaluated to determine acceptability of the non-professional coursework and the sequencing of the professional courses. Every student must meet the Oregon Tech general education requirements for graduation. The Respiratory Care Degree Program includes the presentation of a senior project.

Graduation Requirements
All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled. A minimum of 187 credits must be completed and students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of “C” or better must be earned in all professional courses (RCP), communication courses and science/mathematics courses to continue in the program. All curricular requirements must be met within five academic years once the student is admitted into the professional program as a sophomore.
Bachelor of Science in Respiratory Care

Curriculum

Required courses and terms during which they may be taken.

Pre-Respiratory Care

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Winter</th>
</tr>
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<tbody>
<tr>
<td>BIO 231</td>
<td>Human Anatomy and Physiology I</td>
<td>4</td>
</tr>
<tr>
<td>CHE 101</td>
<td>Introduction to General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHE 104</td>
<td>Introduction to General Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>MATH 111</td>
<td>College Algebra</td>
<td>or</td>
</tr>
<tr>
<td>MATH 243 Introductory Statistics</td>
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<td></td>
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<tr>
<td>WRI 121</td>
<td>English Composition</td>
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<table>
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<th>Spring</th>
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<tbody>
<tr>
<td>BIO 232</td>
<td>Human Anatomy and Physiology II</td>
</tr>
<tr>
<td>PSY</td>
<td>Psychology (PSY 201, PSY 202 or PSY 203)</td>
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<tr>
<td>WRI 122</td>
<td>Argumentative Writing</td>
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<td>Humanities Elective</td>
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<tr>
<td>Social Science Elective</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
</tr>
</tbody>
</table>

Freshman Year

Spring

| BIO 200       | Medical Terminology | 2     |
| SPE 111       | Public Speaking | 3     |
| Humanities Elective | 3     |
| Social Science Elective | 3     |
| Total         | 15   |

Freshman Year

Summer

| COM 205       | Intercultural Communication | 3     |
| WRI 227       | Technical Writing | 3     |
| Humanities Elective | 3     |
| Social Science Elective | 3     |
| Total         | 13   |

Professional Courses

Sophomore Year

| BIO 336       | Essentials of Pathophysiology | 3     |
| CHE 360       | Clinical Pharmacology for the Health Professions | 3     |
| RCP 100       | Matriculation | 2     |
| RCP 231       | Pulmonary Physiology | 4     |
| Total         | 12   |

Sophomore Year

| RCP 221       | Introduction to Patient Assessment | 1     |
| RCP 233       | Emergent Chest Radiographic Interpretation | 2     |
| RCP 252       | Cardiopulmonary Pharmacology | 4     |
| RCP 336       | Hyperinflation Therapies | 2     |
| SPE 321       | Small Group and Team Communication | 3     |
| Total         | 12   |

Junior Year

| RCP 337       | Pulmonary Pathology | 4     |
| RCP 351       | Mechanical Ventilation I | 4     |
| RCP 338       | Advanced Neonatal Respiratory Care | 4     |
| Total         | 12   |

Junior Year

| RCP 352       | Mechanical Ventilation II | 4     |
| RCP 386       | Critical Care I | 4     |
| RCP 389       | International Neonatology | 4     |
| Total         | 12   |

Junior Year

| RCP 336       | Disaster Preparedness | 2     |
| RCP 335       | Exercise Physiology and Education | 2     |
| RCP 345       | Cardiopulmonary Diagnosis and Monitoring | 3     |
| RCP 353       | Mechanical Ventilation III | 4     |
| RCP 387       | Critical Care II | 2     |
| Total         | 13   |

Senior Year

| RCP 350       | Introduction to Clinical | 9     |
| RCP 366       | Clinical Simulation | 3     |
| RCP 440       | Case Management I | 3     |
| Total         | 15   |

Senior Year

| RCP 441       | Case Management II | 3     |
| RCP 450       | Clinical Care I | 9     |
| Total         | 12   |

Senior Year

| RCP 442       | Case Management III | 3     |
| RCP 451       | Clinical Care II | 9     |
| Total         | 12   |

Senior Year

| RCP 452       | Clinical Care III | 12    |
| RCP 460       | Advanced Life Support | 2     |
| Total         | 14   |

Bachelor’s Degree Completion

Respiratory Care

The Respiratory Care program offers a degree completion program for registered technologists in good standing, who wish to pursue a bachelor's degree in their field. The program is offered completely online. There is no on campus residency requirement.

Courses granted for Registered Respiratory Therapist (RRT)

| RCP 100       | Matriculation (waived) | 0     |
| RCP 221       | Introduction to Patient Assessment | 1     |
| RCP 223       | Emergent Chest Radiographic Interpretation | 2     |
| RCP 231       | Pulmonary Physiology | 4     |
| RCP 235       | Arterial Blood Gases | 3     |
| RCP 236       | Cardiopulmonary Dynamics | 3     |
| RCP 241       | Respiratory Gas Therapeutics | 4     |
| RCP 252       | Cardiopulmonary Pharmacology | 4     |
| RCP 336       | Hyperinflation Therapies | 2     |
| RCP 337       | Pulmonary Pathology | 4     |
| RCP 350       | Introduction to Clinical | 9     |
| RCP 351       | Mechanical Ventilation I | 4     |
| RCP 352       | Mechanical Ventilation II | 4     |
| RCP 386       | Critical Care I | 4     |
| RCP 450       | Clinical Care I | 9     |
| RCP 451       | Clinical Care II | 9     |
| RCP 452       | Clinical Care III | 12    |

Oregon Tech Degree Completion Courses

| BIO 336       | Essentials of Pathophysiology | 3     |
| CHE 360       | Clinical Pharmacology for the Health Professions | 3     |
| COM 205       | Intercultural Communication | 3     |
| RCP 100       | Introduction to Respiratory Care | 2     |
| RCP 326       | Disaster Preparedness | 2     |
| RCP 335       | Exercise Physiology and Education | 2     |
| RCP 345       | Cardiopulmonary Diagnosis and Monitoring | 3     |
| RCP 353       | Mechanical Ventilation III | 4     |
| RCP 366       | Clinical Simulation | 3     |
| RCP 387       | Critical Care II | 2     |
| RCP 388       | Advanced Neonatal Respiratory Care | 4     |
| RCP 389       | International Neonatology | 4     |
| RCP 440       | Case Management I | 3     |
| RCP 441       | Case Management II | 3     |
| RCP 442       | Case Management III | 3     |
| RCP 460       | Advanced Life Support | 2     |
| SPE 321       | Small Group and Team Communication | 3     |
| WRI 227       | Technical Report Writing | 3     |
| Humanities Elective | 6     |
| Social Science Elective | 6     |

Total credits required for B.S. in Respiratory Care: 187
Prerequisite/Transfer Courses
BIO 105  Microbiology  4
BIO 200  Medical Terminology  2
BIO 231  Human Anatomy and Physiology I  4
BIO 232  Human Anatomy and Physiology II  4
BIO 233  Human Anatomy and Physiology III  4
CHE 101  Introduction to General Chemistry  3
CHE 104  Introduction to General Chemistry Laboratory  1
MATH 111  College Algebra or
MATH 243  Introductory Statistics  4
PSY 201, 202, or 203  3
SPE 111  Public Speaking  3
WRI 121  English Composition  3
WRI 122  Argumentative Writing  3
    Humanities Elective  3
    Social Science Elective  3
    Elective  2

Selected Courses in Physical Education and Health Education

Physical Education Philosophy and Courses
At Oregon Institute of Technology, the physical education philosophy is that every man and woman can achieve and maintain fitness through a sound program based on varied developmental, sport, and recreational activities. The physical education courses provide basic instruction in vigorous activities.

Course offerings include fitness training, weight lifting, aerobics activities, archery, ice skating, rugby, recreational basketball, tai chi, zumba, yoga, kick boxing, core strength & balance, pilates, rowing, belly dance, scuba, swim classes, relaxation & flexibility, varsity sports and major sports seminars, including weight loss and weight loss management. Other offerings include wilderness navigation, cross country skiing and snowshoeing.

Health Education Philosophy and Courses
Selected courses in health education are provided to assist students to prevent physical and mental health disorders and to promote well-being.

Course Policy
Physical education courses are currently offered as elective credits only. Some courses may require an additional course fee depending on facility and special equipment needs. There is no limit on the number of times a physical education course can be repeated.

Coaching Minor
The Coaching Minor offers Oregon Tech students the opportunity to gain knowledge and skills in coaching. The Coaching Minor features study in the basics of sports medicine, team communication and psychology, and coaching theory. It also includes an opportunity to apply that knowledge to coaching in practical ways. Students who obtain the minor will document their preparation to coach in any sport or situation. For advising or for more information contact the head of the Coaching Minor Committee, currently, Dr. Kevin Brown.

Career Opportunities
The Coaching Minor represents a credential that documents the student’s academic and practical preparation to coach. For students interested in coaching, this should give them an advantage over others without documented training and experience.

Requirements of the Coaching Minor
HED 275  Introduction to Sports Medicine
PSY 376  Sports Psychology
SPE 321  Small Group and Team Communication
PHED 255  Introduction to Coaching Theory
PHED 355  Coaching in Application
PHED 455  Coaching Practicum
Six credits of PHED practice courses:
3 credits of Athletic Conditioning courses (PHED 102, 110 -- 113, 120 -- 123, 125, 126, 146 or 188)
3 credits of Sport Activity courses (PHED 100, 101, 125, 130 -- 132, 141 -- 145, 150, 151, 160 -- 163, 170 -- 175, 180 -- 187 or 201)

It is strongly recommended that students interested in obtaining this minor see a Coaching Minor advisor prior to taking courses.

Note that the requirements constitute 24 credits, of which 12 credits are upper division.
Graduate Programs
Admissions and Academic Policies

Graduate degree programs at Oregon Institute of Technology provide students with opportunities for advanced study in various disciplines. Graduates will develop the competence required for leadership roles in professional fields. Graduate education at Oregon Tech maintains an applied focus. Our mission is to integrate theory and practice.

Admission
The Office of Admissions, in conjunction with the appropriate academic department, maintains all pertinent information regarding the admission of graduate students.

Admission Requirements
To be considered for admission to a graduate program, an applicant must have a baccalaureate degree from a regionally accredited college or university, as well as a scholastic record that evidences the ability to perform satisfactory graduate work. Specifically, a student shall:

1. Have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association.
2. Be in good academic standing at the last college or university attended.
3. Have attained a grade point average of at least 3.0 on a 4.0 scale for the last 90 term (60 semester) units attempted.
4. Have attained a grade point average of at least 3.0 on a 4.0 scale for the last 45 term hours in the major.
5. Satisfactorily meet the professional, personal, scholastic, and other standards for graduate study.
6. Pass qualifying examinations required by specific programs.

Unusual circumstances may warrant exceptions to these criteria.

Application as a Degree-Seeking U.S. Resident Student
Degree-seeking students must submit the following items to the Office of Admissions before the deadlines specified in the Application Deadlines section:

- An official admissions application, along with a $50 non-refundable application fee. The application fee is waived for applicants who are currently attending Oregon Tech or who graduated from Oregon Tech within the previous two years.
- Official transcripts from each postsecondary educational institution attended.

Individual programs may have additional requirements. Applicants must submit all required items before admission to the graduate program will be considered. Submitting the items, however, does not ensure admission. Applicants will receive official notification of admission after a review of the application by the Office of Admissions and the graduate program department.

Application as an International Degree-Seeking Graduate Student
Oregon Tech must assess the academic preparation of international students. For this purpose, international students, including those who hold U.S. visas as student exchange visitors, must undergo an initial review by an evaluation service. There are several such services that are acceptable. A “course-by-course evaluation” or a “detailed report” is necessary.

1. Provide evidence of ability to meet educational expenses at Oregon Tech. The Statement of Financial Responsibility form must be completed and submitted with documentation such as official bank statements and tax returns.
2. Official academic transcripts of all university coursework sent to Oregon Tech.
3. For university coursework done outside the United States, transcripts must be reviewed by an evaluation service. There are several such services that are acceptable. A “course-by-course evaluation” or a “detailed report” is necessary.
4. Proof of proficiency in the English language. Oregon Tech requires that international graduate students submit official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 68 Internet-based TOEFL or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English. Since the results of this test constitute part of the material reviewed for admission to graduate studies at Oregon Tech, students should arrange to have their test scores sent directly from the testing agency to the Office of Admissions well before the application deadline.

The following is an application checklist for degree-seeking international students:

1. Submit the graduate application for admission with the $50 (U.S.) application fee.
2. Submit the international graduate student supplement to the graduate application form (as well as the Statement of Financial Responsibility form), available from the Admissions Office.
3. Submit the international graduate student supplement to the graduate application form (as well as the Statement of Financial Responsibility form), available from the Admissions Office.
4. Official academic transcripts of all university coursework sent to Oregon Tech.
5. For university coursework done outside the United States, transcripts must be reviewed by an evaluation service. There are several such services that are acceptable. A “course-by-course evaluation” or a “detailed report” is necessary.
6. Proof of proficiency in the English language. Oregon Tech requires that international graduate students submit official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 68 Internet-based TOEFL or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English.
7. Students currently in the United States should submit a photocopy of the I-20 form and passport.

Individual programs may have additional requirements.
Application Deadlines
Oregon Tech encourages all prospective students to submit graduate application materials six to nine months in advance of the planned enrollment date. This recommendation is especially important for international students in order to allow sufficient time for visa processing. However, applications will be accepted any time before the deadlines listed below. The recommended entrance time is fall term.

- Fall Term: July 1
- Winter Term: October 1
- Spring Term: January 1

Residency Classification
See the residency section of this catalog.

Tuition and Fees
See the tuition and fees section of this catalog.

Graduate Assistantships
Oregon Institute of Technology offers graduate assistantships, awarded on a competitive basis, to qualified graduate students based on department needs. Compensation varies with the type of service, the amount of time required for performing the service, and the academic qualifications and experience of the appointee. An applicant for a graduate assistantship must be admitted to a graduate program. Graduate departments usually award appointments and assistantships by Summer term, effective at the beginning of the next academic year. A graduate assistant application form is available from the appropriate department.

Types of Assistantships
Graduate assistantships (GAs) at Oregon Tech are either research assistantships (RAs) or teaching assistantships (TAs). Research assistantships are awarded by the faculty member administering the research grant and involve providing assistance in fulfilling the goals and objectives of the grant. Depending upon the grant, research assistantships may include additional support for summer term. If you are interested in a research assistantship, contact the faculty member responsible for the grant.

Teaching assistantships are awarded by the department and involve classroom and laboratory instruction. If you are interested in a TA, contact the individual department to determine availability.

Assistantship Offer
Assistantship notices of appointment are awarded on a term-by-term basis and renewal is dependent upon competent performance of assistantship duties, adequate academic progress, departmental needs, and the availability of funds. Assistantships may include a tuition waiver as well as a monthly stipend based upon a percentage of a full-time equivalent (FTE) salary.

Assistantship Course Load
Graduate assistants are expected to maintain full-time enrollment (nine credits). Graduate assistants not enrolled in nine credits of formal courses must supplement the course load with thesis or project credits to maintain full-time enrollment status.

Satisfactory Progress
Graduate assistants must make satisfactory progress toward a graduate degree to retain a graduate assistantship. Satisfactory progress includes:
- Maintaining a 3.0 or higher grade point average.
- Maintaining full-time student enrollment.

Failure to maintain satisfactory academic progress will result in loss of an assistantship.

Academic Policies
The Graduate Council determines graduate academic policies at Oregon Tech. Other academic policies and procedures are described and/or defined in the general policies of Oregon Tech.

Student Rights and Responsibilities
Oregon Tech encourages students to perform at a high academic level, and students are responsible for knowing degree requirements and enrolling in courses that will enable them to complete the master's program. Oregon Tech expects students to conduct themselves in a manner compatible with the university's function as an institution of higher learning. Students should acquaint themselves with the definitions and implications of academic misconduct, including a failing grade for a test or assignment, a reduced grade for a test or assignment, or a failing grade in the course. Responding to academic dishonesty is the responsibility of the course instructor. If a student commits plagiarism or other academic dishonesty during the graduate project, the advisor, in consultation with the dean, determines the appropriate response.

All graduate students should acquaint themselves with the definitions and implications of academic misconduct as explained in Oregon Tech's student conduct code. Repercussions for a student guilty of academic conduct violations range from a warning to expulsion. Students may contest a charge of academic misconduct by following the grievance procedure outlined in the OIT catalog and the student handbook, available on the Oregon Tech Web site.

Academic Integrity
Oregon Tech's goal is to foster an atmosphere that produces educated, literate graduates. Academic misconduct, such as cheating and plagiarism, will not be tolerated. Cheating includes, but is not limited to, the following:
- Use of any unauthorized assistance in taking quizzes, tests or examinations.
- Dependence upon the aid of sources specifically prohibited by instructors in writing papers, preparing reports, solving problems or carrying out other assignments.
- The acquisition, without permission, of tests or other academic materials belonging to a faculty member of the school.

Plagiarism includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without acknowledging the source. Plagiarism occurs when a student either copies the work of another person and attempts to receive credit for that work or acquires and uses prepared material from someone who is selling academic materials. These examples are intended to provide general guidelines and are in no way comprehensive in describing academic dishonesty.

Faculty may assign specific penalties for cases of academic misconduct, including a failing grade for a test or assignment, a reduced grade for a test or assignment, or a failing grade in the course. Responding to academic dishonesty is the responsibility of the course instructor. If a student commits plagiarism or other academic dishonesty during the graduate project, the advisor, in consultation with the dean, determines the appropriate response.

All graduate students should acquaint themselves with the definitions and implications of academic misconduct as explained in Oregon Tech's student conduct code. Repercussions for a student guilty of academic conduct violations range from a warning to expulsion. Students may contest a charge of academic misconduct by following the grievance procedure outlined in the OIT catalog and the student handbook, available on the Oregon Tech Web site.

Student Records
The Registrar's Office maintains a permanent file for each graduate student. Faculty advisors will maintain a file of advising records, grade information and other correspondence.
pertaining to each graduate student’s academic progress. For more information on student records, contact the Registrar’s Office.

**Enrollment Status**

Full and part time credit loads for graduate students are defined as follows:
- Full time: 9 or more credits
- 3/4 time: 7 - 8 credits
- Half time: 5 - 6 credits

Oregon Tech undergraduate seniors may enroll in 500-level graduate courses for graduate credit with the approval of the student’s undergraduate advisor and the graduate program director.

Students who are not yet admitted to Oregon Tech may take up to one third of the graduate program credits as a non-admit student and apply them toward the graduate degree upon formal admission to the graduate program.

Oregon Tech offers some courses which are dual-listed at the 400- and 500-level. The 400-level courses apply only to an undergraduate degree, while 500-level courses apply to both undergraduate and graduate degrees. Students enrolled in a dual-listed 500-level course will be required to complete additional work to obtain graduate credit.

**Academic Prerequisite Deficiencies**

Students who have prerequisite deficiencies for graduate studies may be required to take additional course work prior to completing their graduate studies, as determined by the graduate program director. If there are deficiencies, the director will recommend substitute courses, and these are entered on the Graduate Program Form. When students pass these courses with a B or better, they become fully qualified graduate students. Prior to completion of the listed courses, the graduate student is considered “provisionally admitted.”

**Academic Performance Standards**

Students must maintain a cumulative GPA of 3.0 or better in all graduate work specific to the program of study to remain in good academic standing. Grades below C do not meet requirements for a graduate degree.

Graduate students earning a cumulative GPA of less than 3.0 will be placed on probation and, if no improvement is made, will be suspended from the graduate program. Conditions established for probation and suspension are listed below:

**Academic Probation:** Students having 9 or more attempted credit hours will be placed on academic probation for each term that their cumulative GPA falls below 3.0.

**Academic Suspension:** Students who have served one term on academic probation and have not raised their graduate cumulative GPA to 3.0 in the next term will be placed on academic suspension. Suspended students lose their institutional financial aid, including graduate research and teaching assistantships. A student may appeal academic suspension by following the process outlined in the Oregon Tech catalog. A successful appeal results in probation status.

**Transfer Credits**

Students may petition to transfer up to one third of the program graduate term hours earned at other accredited institutions and apply those credits toward an Oregon Tech graduate degree. However, each course must be consistent with the program of study planned by the student and the graduate advisor. Only grades of A and B are acceptable as transfer credit into the graduate program.

**Grading Policy**

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student’s performance will be graded by the instructor and reported to the Registrar’s Office.

**Requirements**

Graduate degree academic requirements are specified by the program. The student, in conference with the graduate faculty advisor, will prepare a program of study for the graduate degree as a guide for planning an academic schedule.

**Application for Graduation**

To apply for graduation, the student must submit a petition for graduation to the Registrar’s Office two terms in advance of the anticipated final term of work. The petition is a record of the approved program of study. To receive favorable action, candidates must meet the following requirements:

- Show that course requirements for the master’s degree will be satisfied before or during the final term.
- Maintain an overall grade point average of at least 3.0.
- Provide evidence of passing any qualifying or comprehensive examinations, including defense of the master’s project or thesis.
- Obtain approval of both the student’s academic advisor and department chair, or by the program director or other faculty member in the event that the student’s academic advisor is the department chair.

**Right of Appeal**

Students have the right to appeal academic policies or requirements. Grade appeals should be initiated through the instructor, graduate program coordinator, and the dean. For appeals regarding specific degree requirements, students should consult their graduate advisor, the graduate program coordinator, and the Graduate Council. Students should submit all other academic policy appeals in writing to the Graduate Council through the Office of the Vice President for Research.
Course Descriptions

Course descriptions in this section are reasonable summaries only and are neither completely inclusive nor completely exclusive of total course content for any given course.

Courses listed herein may or may not be offered each term.

Courses are listed alphabetically according to prefix.

Numbering Code

Courses are grouped into a three-digit number series which indicates the normal teaching levels. Some variations may occur.

1-99 Preparatory and Developmental Courses. Courses numbered below 100 are not applicable toward a degree even though units are assigned, grades are awarded and tuition is assessed.

Lower-Division Courses (freshman and sophomore)
100-199 First-Year Courses
200-299 Second-Year Courses

Upper-Division Courses (junior and senior)
300-399 Third-Year Courses
400-499 Fourth-Year Courses

Graduate Courses
500-599 Graduate Courses

Other Codes

Each Term:
Some courses in this section have a code following the course title. This code designates when the course will be offered. F indicates fall, W indicates winter, S indicates spring.

Lecture, Lab, Credit Hours:
The three numbers following the course title. For example:
CST 101 Introduction to Personal Computing
(3-3-4) = weekly lecture hours – lab hours – total credits
Courses with the following notation fulfill the appropriate general education requirements:

- Communication (C)
- Humanities (H)
- Humanities Performance (HP)
- Social Science (SS)

Special Terms
As Required: This term designates a course or series of courses which will be offered only as enrollment, student interest, or individual department needs demand and as staffing allows. A course so designated may be offered if special student needs, situations of extreme hardship, or other unusual circumstances deem it in the best interest of both the student(s) and the institution to do so.

Hours to be Arranged Each Term: Normally students negotiate individually with faculty members and/or departments and arrange to have courses so designated offered for the term most suitable to their unique situation.

Corequisite: A course that must be taken simultaneously with another course. Corequisites are noted at the end of each course description.

Prerequisite: A course that must be passed satisfactorily before another course may be taken. Prerequisites are noted at the end of each course description. Courses transferred in to Oregon Tech with a C- or better meet the prerequisite requirement of obtaining a C or better.

Quarter Credit: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

A numerical credit value assigned to certain number of lecture or laboratory hours. A lecture class meeting for three 50-minute periods a week would be assigned three units of credit. Students have traditionally been expected to spend an additional six hours of outside class work per week for each three units of lecture class credit. Generally, a lab class requires three hours per week for one unit of credit, or a total of nine in-lab hours with no additional outside class work expected for three units of lab class credit.

(ABA) Applied Behavior Analysis

ABA 511 Foundations of ABA I
(F)(3-0-3)
Basic principles, characteristics, and concepts of Applied Behavioral Analysis (ABA). Includes history of ABA, terminology, and applications.

Reading and Conference: A course taken on an independent study basis with the supervision of an instructor, usually consisting of weekly conferences, assigned readings, research papers, etc.

Seminar: A class taught by a group discussion process rather than by means of formal lecture. Student research and reporting are usually expected.

Sequence: A series of classes in the same subject area that, taken as a whole, comprise a full year’s work. Generally, course sequences are numbered consecutively, and often (though not always) should be taken in the numerical order listed (i.e., CHE 201 should be taken before CHE 202, etc.).

Prerequisite: ABA 511

ABA 512 Foundations of ABA II
(W)(3-0-3)
Basic principles, characteristics, and concepts of Applied Behavioral Analysis (ABA). Foundational knowledge for practice of ABA; introduction to measurement and data analysis.

Prerequisite: ABA 511

ABA 521 Ethics and Professional Issues I
(F)(3-0-3)
Introduction to ethical and professional issues in Applied Behavior Analysis (ABA). Professional identity, certification and licensure, code of conduct, confidentiality and privacy.

ABA 522 Ethics and Professional Issues II
(W)(3-0-3)
Examines ethical and professional issues in Applied Behavior Analysis (ABA) including ethical and professional conduct, ethical decision making, implementation, management and supervision, and professional practices.

Prerequisite: ABA 521

ABA 525 Research Methods in ABA
(W)(3-0-3)
Methods for conducting valid and reliable behavioral measurement and experimental evaluations of behavioral interventions, including data collection, data display, and data interpretation and designing and evaluating behavioral research designs.

ABA 526 Behavioral Assessment
(S)(3-0-3)
Behavioral assessment including descriptive assessments and functional analysis; methods of assessment, data collection and interpretation; assessment based selection of intervention; ethical and practical issues.

ABA 531 Behavioral Change I
(S)(3-0-3)
Fundamental elements of, and ethical and practical considerations related to behavior...
change, behavioral interventions, behavior change systems, and specific behavior change procedures.
Prerequisite: ABA 512

ABA 532 Behavior Change II
(Su)(3-0-3)
Behavior analytic interventions. Fundamental elements of, and ethical and practical considerations related to behavior change, behavioral interventions, behavior change systems, and specific behavior change procedures.
Prerequisite: ABA 531

ABA 535 Special Topics in ABA
(Su)(3-0-3)
Examination of systems, interventions, current issues, and/or advances in Applied Behavior Analysis; includes focus on strategies for managing program implementation and supervision of behavior change agents. Topics vary.
Prerequisites: ABA 525 ABA 531

(ACAD) Academic Success
ACAD 101 Student Success Seminar
(F,W,S)(Variable Credit)
A course to facilitate the success of first year students at Oregon Tech. Emphasis on faculty-student and student-student interactions. Includes academic resources, campus services, the learning process, communication skills, health and wellness issues. May also include academic skills and career planning.

ACAD 105 Achieving Academic Success
(F,W,S)(2-0-2)
Course identifies attitudes, behaviors and specific strategies that will lead to academic success at the college level. Topics may include study habits, time management, strategies for memorization and test-taking and goal-setting.

ACAD 107, ACAD 207, ACAD 307, ACAD 407 Seminar
(Hours to be arranged each term.)

ACAD 115 Career Exploration
(F)(3-0-3)
Effective academic and career decision-making is facilitated through thorough self-assessment, exploration of the world of work and identification of appropriate academic majors. Course includes activities such as personal-type testing, research, visits to academic departments and information interviews with professionals in various occupations.

ACAD 120 Stress Management
(F,S)(2-0-2)
Identifies signs and symptoms of stress as well as the ways in which they impact student academic success. Effective ways of dealing with stress, including relaxation techniques, will be identified, discussed and practiced.

ACAD 135 Reading Tutor
(2-0-2)
For “America Reads” tutors. Provides information about how children learn to read and write, strategies for teaching children and working in an elementary school.

(ACC) Accounting
ACC 101 Introduction to Accounting
(F, W,S)(3-0-3)
The principles of elementary accounting systems for small businesses.

ACC 107, ACC 207, ACC 307, ACC 407 Seminar
(Hours to be arranged each term.)

ACC 115 Basic Income Tax Preparation
(2-4-3)
Federal and state laws, ethics and regulations applicable to individual income tax returns. Prepares tax preparers for the qualifying examination and meets the personal needs of individuals preparing their own returns.

ACC 124 Business Math/Machines
(F)(3-0-3)
Business math such as decimals, percents, markups, proration and interest. Emphasis on operational techniques of electronic calculators for problem solving.

ACC 201 Principles of Accounting I
(F,W)(4-0-4)
Introduction to terminology, content and form of financial statements for sole proprietorships. Recording of data for use in preparing profit-and loss statements and balance sheets.
Prerequisite: MATH 100 or equivalent.

ACC 202 Principles of Accounting II
(W,S)(4-0-4)
A continuation of ACC 201 with emphasis on corporate accounting.
Prerequisite: ACC 201 with grade “C” or better.

ACC 203 Principles of Managerial Accounting
(F,W,S)(4-0-4)
Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Technique of standard costs, analysis of variance, managerial reports and specialized cost programs including activity based costing systems.
Prerequisite: ACC 201 with grade “C” or better.

ACC 205 Computerized Accounting
(W,S)(2-3-3)
Spreadsheet software used to solve accounting problems, model-building techniques. Integrated accounting software introduced.
Prerequisite: ACC 201.

ACC 245 Payroll Accounting
(W)(3-0-3)
Covers federal and state laws pertaining to wages, payroll taxes, payroll tax forms and journal and general ledger transactions. Emphasis is placed on computing wages; calculating social security, income and unemployment taxes; preparing appropriate payroll tax forms; and journalizing/posting transactions.
Prerequisite: ACC 101 or ACC 201.

ACC 295 Individual Studies
(Hours to be arranged each term.)

ACC 298 Reading and Conference
(Hours to be arranged each term.)

ACC 299 Laboratory Practice
(Hours to be arranged each term.)

ACC 320 Cost Accounting I
(W)(4-0-4)
Cost accumulation systems including job order costing, process costing and activity-based costing will be explored. Techniques to control and evaluate operations including variance analysis based on flexible budgets and standard costs.
Prerequisite: ACC 203 with grade “C” or better.

ACC 321 Cost Accounting II
(S)(4-0-4)
Continuation of Cost Accounting I. Strategic planning and financial budgeting. Cost
measurement, planning, control and performance evaluation and behavioral issues. The role of responsibility accounting for revenue, cost, contribution and profit centers will be investigated.
Prerequisite: ACC 320 with grade “C” or better.

ACC 325 Finance
(F,W,S)(4-0-4)
Emphasis on working capital management, long-term finance and capital structure.
Prerequisites: ACC 203, and MATH 105 or MATH 111.

ACC 331 Intermediate Accounting I (F)(4-0-4)
Financial accounting concepts, theory and practices involving current asset accounts; practical application of theory to accounting problems.
Prerequisite: ACC 202 with grade “C” or better.

ACC 332 Intermediate Accounting II (W)(4-0-4)
Accounting concepts, theory and practices involving plant assets, intangible assets and liabilities; practical application of theory to accounting problems.
Prerequisite: ACC 331 with grade “C” or better.

ACC 333 Intermediate Accounting III (S)(4-0-4)
Accounting concepts, theory and practices involving plant assets, intangible assets and liabilities; practical application of theory to accounting problems.
Prerequisite: ACC 332 with grade “C” or better.

ACC 405 Accounting Information Systems (S)(4-0-4)
Analysis of accounting cycles and the associated controls with emphasis on problem solving and critical thinking. Includes computerized accounting system implementation.
Prerequisites: ACC 332, MIS 275, MIS 312.

ACC 411 Income Tax Procedures (F)(4-0-4)
Federal and state income tax laws and regulations applicable to individuals and their businesses including computerized tax return preparation.
Prerequisite: ACC 333 with grade “C” or better.

ACC 412 Corporate Taxation (W)(4-0-4)
Federal tax law applicable to corporations, partnerships and estates. Emphasis on tax research procedures and locating and evaluating various sources of tax law.
Prerequisite: ACC 411 with grade “C” or better.

ACC 421 Income Tax Procedures Laboratory (0-6-2)
Lab accompanying class content in ACC 411.

ACC 431 Advanced Accounting I (W)(4-0-4)
Prerequisite: ACC 333 with grade “C” or better.

ACC 432 Advanced Accounting II (S)(4-0-4)
Analysis of problems facing small, medium and large companies, with emphasis upon an integrated and concurrent decision making methodology applying economics, finance, organizational theory, quantitative analysis and accounting and tax theory.
Prerequisite: ACC 431 with grade “C” or better.

ACC 435 Auditing (F)(4-0-4)
Introduction to auditing concepts and practices. Topics include professional standards, audit planning and procedures, ethical considerations, internal controls, professional responsibilities, the acquisition and evaluation of audit evidence and report writing.
Prerequisites: ACC 333, ACC 405, both with grade “C” or better.

ACC 465 Case Studies in Accounting (S)(4-0-4)
The use of accounting cases to develop problem solving/critical thinking skills. Application of the case methodology to all areas of accounting.
Prerequisites: ACC 431, ACC 435, ACC 496, all with grade “C” or better.

ACC 496, ACC 497 Senior Project (F/W)(3-0-3)
Development and implementation of an accounting related project for the benefit of an external entity and the student. Projects will include a proposal, analysis, design and implementation. An oral presentation and project documentation will be required at the completion of each course.
Prerequisites: ACC 320 and ACC 405, or instructor consent.

(AHED) Allied Health Education
AHED 107, AHED 207, AHED 307, AHED 407 Seminar (Hours to be arranged each term.)

AHED 450 Instructional Methods (F,W)(3-0-3)
Students develop instructional content and an instructional plan for teaching topics for adult learners. Teaching methods, learning styles, student and instructor evaluation and use of media will be discussed.
Prerequisite: DH 380 or admission to RCP or BDH degree completion program.

AHED 451 Instructional Experience (ES)(2-3-3)
Students create and structure their own instructional experience, participate in a clinical or laboratory setting as a supervising instructor, present a didactic unit using visual aids.
Prerequisite: AHED 450.

AHED 452 Instructional Practicum (WS)(0-9-3)
Student and faculty advisor design an individualized teaching experience. A learning contract is written and implemented.
Prerequisite: AHED 451 or AHED 460.

AHED 460 Fundamentals of Distance Education (ES)(3-0-3)
Students learn the fundamentals of online teaching and learning. Lesson plan developed in AHED 450 will be finalized as an online module. Synchronous vs. asynchronous learning, instructional design and course management as it relates to online instruction will be discussed.
Prerequisite: AHED 450.
(ANTH) Anthropology

ANTH 101 Introduction to Physical Anthropology
(W)(3-0-3) SS
An introduction to physical anthropology, emphasizing man's place in the animal kingdom, evolution of man, fossil hominid forms, Paleolithic cultures and principles of genetics. Satisfies either a science elective or a social science elective.

ANTH 102 Introduction to Archeology
(F,S)(3-0-3) SS
Survey of the science of archeology. Covers the biological and social evolution of the human species with emphasis on the growth of human populations and social complexity. Relates site-specific evidence to theories of social change. Discusses field and laboratory methods of archeology.

ANTH 103 Introduction to Cultural Anthropology
(F,W)(3-0-3) SS
Culture, language, subsistence patterns, group formation, kinship, economic systems, political organizations, religion and cultural change.

ANTH 107, ANTH 207, ANTH 307, ANTH 407 Seminar
(Hours to be arranged each term.) SS

ANTH 335 The Built Environment
(W)(3-0-3) SS
An examination of the American built environment from historical to modern times and the role it plays in shaping American Society. The topics include city planning, architecture, transportation technologies, dam and bridge building and urban sprawl.

ANTH 452 Globalization
(F,W,S)(3-0-3) SS
Addresses what globalization is and how it developed and spread. Benefits and harms of globalization in the areas of work, culture, warfare, national sovereignty, health and food. Countervailing pressures from social movements will be examined. Prerequisite: WRI 122.

(Art) Art

ART 107, ART 207, ART 307, ART 407 Seminar
(Hours to be arranged each term.) H or HP

ART 205: Introduction to Watercolors
(F,W,S)(3-0-3) HP
Introductory studio course in beginning watercolor painting. Students will learn a variety of watercolor techniques as well as elements of design and aesthetics.

ART 210 Beginning Sculpture
(F,S)(3-0-3) HP
Introductory studio course in beginning sculpture, emphasizing basic materials and techniques.

ART 220 Basic Drawing
(F,W,S)(3-0-3) HP
Designed for the student who has an interest in exploring the field of pictorial representation but has had, for a variety of reasons, little opportunity to do so.

ART 226 Digital Photography
(F,W,S)(3-0-3) HP
Studio course in digital photography, studying and producing photographs. Focus on digital exposures, color, location, Photoshop techniques and issues in photography. Students must have the use of a digital SLR camera or a digital camera with a manual setting.

ART 280 Introductory Painting
(F,W,S)(3-0-3) HP
Offers an opportunity to study rendering in color by exposure to a study of color and color mixing, tones and values with an introduction to acrylics, watercolors and oils.

ART 282 Introduction to Acrylic Painting
(F,W,S)(3-0-3) HP
Introductory studio course with emphasis on basic materials and techniques in acrylic painting.

(BIO) Biology

BIO 101 Introduction to Cell Biology
(F)(3-3-4)
Introduction to cell biology, genetics, basic chemistry of living organisms, and the scientific method.

BIO 102 Introduction to Organismal Biology
(W)(3-3-4)
Evolution and phylogenetics among all major groups of living organisms, including bacteria, protists, fungi, plants and animals.

BIO 103 Introduction to Human Anatomy
(S)(3-3-4)
Basic human anatomy and physiology, including a survey of all major bodily systems. (Cannot be used for graduation credit by students who have taken BIO 231, BIO 232 and BIO 233)

BIO 105 Microbiology
(W)(3-3-4)
Classification, morphology, reproduction, transmission and control of micro-organisms causing disease in man. Laboratory practice in culturing methods, microscopic observation and physical and chemical control.

BIO 107, BIO 207, BIO 307, BIO 407 Seminar
(Hours to be arranged each term.)

BIO 109 Introduction to the Medical Sciences
(W,S)(1-2-2)
Survey of medical and health-related occupations, including biomedical sciences. Discussion of health care structure, private and public entities, the research community and trends in health education and practice.

BIO 111 Introduction to Environmental Sciences
(F)(3-3-4)
A topical overview of environmental sciences stressing the integration of the social, natural and physical sciences. Emphasis on active learning.

BIO 135 Preparation for Human Anatomy and Physiology
(F)(1-0-1)
Study techniques for a science course are explored using examples from Human Anatomy and Physiology. Corequisite: BIO 231

BIO 200 Medical Terminology
(F,W,S)(2-0-2)
Basic structure of medical works including prefixes, suffixes, roots and combining forms. Correct spelling, pronunciation and meaning of terms are stressed.

BIO 205 Nutrition
(S)(3-0-3)
A study of the relationships of food and nutrition to health. An overview of the basic
Courses with the following notation fulfill the appropriate general education requirements:

- Communication (C)
- Humanities (H)
- Humanities Performance (HP)
- Social Science (SS)

For more information, see page 31
BIO 327 General Ecology  
(S)(3-3-4)  
An examination of ecological principles applied to microhabitats, habitats and ecosystems. Includes community ecology, population ecology and resource analysis, supplemented by regional and local field exercises with training in measurement and collection of ecological components. Corequisites: GEOG 105, BIO 111 and BIO 213.

BIO 331 Human Anatomy and Physiology I  
(F)(3-6-5)  
An in-depth systematic study of human anatomy and physiology of the integumentary, skeletal and musculoskeletal systems. Laboratories include histology, examination of human bones, cadaver dissection, computer-aided physiology studies and other hands-on activities. Pre-or corequisite: BIO 200 or instructor consent. Prerequisites: BIO 213 and CHE 223, both with grade “C” or better.

BIO 332 Human Anatomy and Physiology II  
(W)(3-6-5)  
An in-depth systematic study of human anatomy and physiology of nervous, endocrine and cardiovascular systems. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities. Prerequisite: BIO 331 with grade “C” or better, or instructor consent.

BIO 333 Human Anatomy and Physiology III  
(S)(3-6-5)  
An in-depth systematic study of human anatomy and physiology of the lymphatic, respiratory, digestive, urinary and reproductive systems and an overview of embryology. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities. Prerequisite: BIO 332 with grade “C” or better, or instructor consent.

BIO 335 Cross-Sectional Anatomy  
(E,F,W,S)(3-0-3)  
Cross-sectional anatomy correlated with computer tomography, ultrasonography and magnetic resonance imaging. Prerequisite: BIO 233.

BIO 336 Essentials of Pathophysiology  
(FS)(3-0-3)  
Study of dynamic aspects of disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations, normal immunology, neoplasia, inflammation and alterations of the respiratory and skeletal systems and Diabetes Mellitus. Prerequisites: BIO 200 and BIO 233.

BIO 337 Aquatic Ecology  
(S)(2-6-4)  
Aquatic ecosystems, patterns of development, population dynamics, diversity and energy cycles in marine and freshwater communities. Local and extended one- or two-day field trips to study different ecosystems off-campus. Procedures for sampling, data collection, numerical modeling and simulation studies of aquatic pollutants. Prerequisites: BIO 212, BIO 327.

BIO 341 Medical Genetics  
(F,W)(3-0-3)  
Principles of heredity, chromosome mechanisms and molecular genetics applied to disease processes in humans. Review of case histories of selected inherited disorders. Discussion of genetic intervention therapies. Prerequisite: BIO 213 or BIO 233 or instructor consent. Prerequisites: BIO 213, BIO 327, or instructor consent.

BIO 342 Cell Biology  
(S)(3-3-4)  
Organelle organization, protein sorting, cell signaling, cytoskeletal functions, cell division mechanics and cell interactions in development and aging. Prerequisite: BIO 213 or instructor consent.

BIO 345 Medical Microbiology  
(F)(4-3-5)  
Mechanisms of pathogenicity and virulence relating to disease-causing viruses, bacteria, fungi and other microorganisms. Host-parasite relationships and immunology, microbial physiology and genetics. Laboratory procedures and identification of selected bacteria and parasites. Prerequisite: BIO 213 or BIO 233 or instructor consent.

BIO 346 Pathophysiology I  
(W)(3-0-3)  
Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations, normal and abnormal immunology, neoplasia, inflammation, atherosclerosis, hypertension, cardiac and vascular diseases. Prerequisites: BIO 200, and BIO 233 or BIO 333 with grade “C” or better, or instructor consent.

BIO 347 Pathophysiology II  
(S)(3-0-3)  
Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of alterations of respiratory function, liver and digestive system, neurologic, urinary, musculoskeletal disorders and Diabetes Mellitus. Prerequisite: BIO 346 with grade “C” or better, or instructor consent.

BIO 351 Vertebrate Biology  
(F)(3-3-4)  
This course will explore both diversity and evolutionary history of the vertebrates. Emphasis placed on functional morphology and adaptive physiology as related to the evolutionary history of each vertebrate class. The laboratory will introduce basic vertebrate structure and morphological adaptation. Prerequisite: BIO 213.

BIO 352 Developmental Biology  
(W)(3-3-4)  
This course will explore the developmental processes of selected invertebrate and vertebrate groups. The events of gametogenesis, fertilization, gastrulation, neurulation and post-embryonic development will be discussed. The role of differential gene expression in developmental pathways will be covered. Prerequisite: BIO 213.

BIO 357 Introduction to Neuroscience  
(W)(3-0-3)  
This is an introductory course covering the organization and function of the human nervous system to build a foundation of general knowledge in neurobiology of such topics as sensory/motor systems, the brain and behaviors, the biological basis of brain development and learning and memory. Prerequisite: BIO 232 or BIO 332 or PSY 339 or instructor consent.

BIO 409 Current Research Topics in Medical Sciences II  
(W)(2-0-2)  
A continuation of BIO 209 covering topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities     HP - Humanities Performance     SS - Social Science
national human resource management. Prerequisite: WRI 121.

BUS 309 Introduction to Tourism (F,W,S)(3-0-3)
Introduction to tourism industry. Topics include major components of tourism, service suppliers, travel, transportation, accommodations, food and beverage, attractions, entertainment, destinations and impacts of tourism on society.

BUS 313 Health Care Systems and Policy (3-0-3)
This course will explore the U.S. Health System focusing on it’s historical development, current configuration and possible future direction. Included will be the study of health system development, key influencers, accessibility, financing, changing components and the effects the system has on patients, providers, financiers, employers, government and insurers. Particular attention will be paid to the future direction of healthcare and what parts of the system are likely to change. Prerequisite: WRI 227.

BUS 314 Entrepreneurship I (F)(3-0-3)
Start-up concepts and models. Identification and assessment of the critical factors that lead to a successful start-up. Focus on small business idea generation and the analysis of market opportunities in B2C and B2B markets. Conduct a market and financial feasibility study. Prerequisites: BUS 215, or BUS 304, or BUS 317; ACC 203 and BUS 223 or instructor consent.

BUS 316 Total Quality in Health Care (F,W,S)(3-0-3)
The health care quality management process, contemporary issues and trends involved with quality control, organization structures, policies, human factors and teamwork. Prerequisite: Junior standing.

BUS 317 Health Care Management (F,W,S)(3-0-3)
The health care manager's role in planning, organizing, leading and controlling. Special emphasis on the unique and complex issues involved in health care management. Organizational structures. Strategic and operational planning. Health care finance and budgeting. The future of management. (Cannot be taken for graduation credit by students who have taken BUS 215 or BUS 304.) Prerequisite: WRI 121.

BUS 318 Marketing II (W)(3-0-3)
Advanced study of markets with a focus on the motivational and behavioral characteristics of consumers. Study and apply analytics, technology and data-driven decision making in the formation of a customer centered marketing and marketing communication strategy. Prerequisites: BUS 223, PSY 201.

BUS 319 Integrated Marketing Communication (F,S)(3-0-3)
Integrated marketing communication promotion mixes and strategies, tactics and media to influence buyer behavior and brand equity with various markets. Application of marketing communication tools through the development of a promotional campaign with goals, core themes, designs, budgets and specifications. Prerequisite: BUS 223 or BUS 337.

BUS 325 Finance Management (W,S)(3-0-3)
Basic issues and methodology of financial management. Emphasis placed on working capital management, sources of short-term and long-term funds and optimal capitalization of the firm. Prerequisites: BUS 215; ACC 203.

BUS 326 Sales and Sales Management (F,S)(3-0-3)
Fundamentals of selling products and services and sales management in various markets, buying behavior and processes, adaptive selling skills, establishing and selling the value proposition, role playing and sales simulations, after sale considerations and review of current customer relationship management systems. Prerequisite: BUS 223.

BUS 328 Health Care Accounting and Finance (F)(3-0-3)
General principles and application of managerial accounting in health care organizations. Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Revenue cycle, sources and systems analysis of variance, cost effectiveness and managerial reporting are examined. Prerequisite: ACC 201.

BUS 331 Personal Finance (F,W,S)(3-0-3)
Introduction to the basic principles of personal financial planning and budgeting. Includes banking services, consumer credit, asset purchases, insurance and the fundamentals of investments and retirement planning.

BUS 335 Entrepreneurship II (S)(3-0-3)
Complete a full marketing, financial and operational business plan for a new business venture. Students will learn and apply fundamental strategic decisions for small business entrepreneurs in all facets of starting, operating and growing a business. Prerequisite: BUS 314 or instructor consent.

BUS 337 Principles of Health Care Marketing (F,W,S)(3-0-3)
Fundamentals of health care marketing covering strategy, planning process, assessment, marketing actions, branding and evaluation.

BUS 345 Fraud Examination (S)(3-0-3)
Study of fraud and fraud investigative techniques. Topics include nature of fraud, types of fraud, fraud prevention, detection and investigation methods and legal follow-up procedures.

BUS 347 Geography of Travel and Tourism (F,W,S)(3-0-3)
Study of those destinations around the world that are most important to travelers including the World Heritage sites. Topics include fundamentals of geography, both physical and cultural, and major tourism destinations.

BUS 349 Human Resource Management I (W,S)(3-0-3)
Principles, theories and applications of HR management in the areas of strategy, workforce planning, employment law, job analysis, recruitment, selection, training, performance management and international HRM. Prerequisite: BUS 215 or BUS 304 or BUS 317 or instructor consent.
BUS 350 Hospitality Management  
(S)(3-0-3)  
Study of management principles in the tourism and hospitality industry. Topics include managing growth and change in the hospitality industry, major functional areas in hotels and restaurants and the economic aspects of the industry.

BUS 356 Business Presentations  
(F, W, S)(3-3-4)  
Design, preparation and delivery of effective business presentations. Emphasis on integration of skills in speech and digital communication software to deliver effective, informative and persuasive presentations in any business or organization.  
Prerequisites: SPE 111, WRI 122.

BUS 358 Marketing for Hospitality and Tourism  
(S)(3-0-3)  
Study of marketing principles as they apply to the tourism and hospitality industry. Topics include marketing in strategic planning, the marketing environment, marketing information systems and marketing research, consumer buying behavior, market segmentation, product pricing, distribution channels and internet marketing. (Cannot be taken for graduation credit by students who have taken BUS 399 Special Topics: Marketing Tourism.)

BUS 385 Ecotourism  
(S)(3-0-3)  
Study of sustainability principles as they apply to the tourism and hospitality industry. Topics include the ecotourism environment, the economic, sociological and cultural impacts of ecotourism, ecotourism as a business and a world survey of ecotourism sites.  
Prerequisite: WRI 121.

BUS 387 International Human Resource Management  
(F)(3-0-3)  
In-depth review of human resource selection, training for international assignments, managing the expatriate manager, compensation packages, repatriation training, women and dual-career couples, conflicting interests of parent company and host country and dual-career couples, conflicting interests.

Prerequisites: ACC 325, WRI 227, Senior standing and approval from senior project advisor.

BUS 397 Human Resource Management II  
(S)(3-0-3)  
Comprehensive study of global business issues that develop strategic visions for market entry in emerging and developed countries, analyzing financial and pricing considerations, evaluating strategies of export versus local manufacturing, developing a marketing program that demonstrates implementation of global business principles.  
Prerequisites: BUS 223, BUS 308.

BUS 399 Marketing Special Topics  
(3-0-3)  
Concentrated areas of marketing will be taught on a rotating basis: business to business, hospitality and travel, entertainment and sports, high tech, direct marketing and public relations.  
Prerequisite: BUS 223.

BUS 405 Reading and Conference  
(Hours to be arranged each term.)

BUS 415 Environmental Regulation  
(S)(3-0-3)  
Legislation and enforcement activities involving natural and industrial environments. Conservation laws, land use and planning, responsibilities of regulatory agencies, review of current legislative actions and judicial decisions.  
Prerequisite: BIO 112 or BUS 226.

BUS 416 Environmental Management  
(W)(3-0-3)  
Review of contemporary management issues and business practices related to land use management and planning, ecological planning, environmental quality engineering and control and natural resource economics.  
Prerequisites: BUS 415 and ECO 201 or BIO 112.

BUS 420 Applied Management Internship  
(F)(0-9-3)  
This course provides credit for an approved internship related to the student’s program. Students work in a supervised setting where they receive training to develop career related skills while applying college learned theory. This course can substitute for BUS 496.  
Prerequisites: ACC 325, WRI 227, Senior standing and approval from senior project advisor.

BUS 434 Global Marketing  
(S)(3-0-3)  
Comprehensive study of global business issues that develop strategic visions for market entry in emerging and developed countries, analyzing financial and pricing considerations, evaluating strategies of export versus local manufacturing, developing a marketing program that demonstrates implementation of global business principles.  
Prerequisites: BUS 223, BUS 308.

BUS 435 Marketing III  
(S)(3-0-3)  
Marketing management strategies within a marketing centric business or organization, including the development of new products and services in response to market demands. Development of collaborative strategies in distribution, pricing and product/service mixes for new projects, services and line extensions.  
Prerequisite: BUS 318.

BUS 441 Leadership I  
(F, W)(3-0-3)  
Role of managers and leaders within an organization. Recognizing styles, competencies and traits of a leader and strategic application within a working environment through case analysis and discussion, introduction and development of personal leadership skills.  
Prerequisite: BUS 349 or instructor consent.

BUS 442 Leadership II  
(3-0-3)  
Leadership in developing and communicating vision/mission, values, setting ethical standards. Leading and developing multi-levels of managers. Mentoring high potential managers and transformational leaders. Leadership during conflict, change and diversity. The role of the leader in organizational development.  
Prerequisite: BUS 441.

BUS 447 Controversial Issues in Management  
(W, S)(3-0-3)  
Examination of the many controversial issues in management such as social responsibility, whistle blowing, outsourcing, drug testing, Affirmative Action and so on. Students will study opposing views and arguments from a variety of viewpoints. Discussion and debate develops critical thinking skills.  
Prerequisites: BUS 215, BUS 304 or BUS 317; PSY 347, WRI 122, and junior standing.

BUS 456 Business Research Methods  
(F, W, S)(3-0-3)  
Research design, exploration and proposals. Hypotheses formulation and testing. Data sources, collection and analysis. Survey de-
Courses with the following notation fulfill the appropriate general education requirements:

- **C** - Communication
- **H** - Humanities
- **HP** - Humanities Performance
- **SS** - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
and moment frames. Seismic resistance and
the development, anchorage, and splicing of
steel reinforcement are introduced.
Pre-requisite: CE 341.

CE 444 Intermediate Steel Design
(S)(4-0-4)
Design of structural steel tension members,
frameworks, composite beams, and bolted
and welded connections. Application of the
AISC Steel Construction Manual structural
stability provisions and software applications.
Pre-requisite: CE 341 with grade "C" or
better.

CE 447 Masonry Design
(S)(3-0-3)
Analysis and design of masonry beams, walls
and columns using computer solutions with
emphasis on lateral design considerations.
Prerequisite: CE 341 with grade "C" or
better and gravity elements with software ap-
lications as appropriate.

CE 448 Timber Design
(W,S)(3-0-3)
Analysis and design of simple (determinate)
timber beams, columns, trusses and connec-
tions using dimensioned lumber, plywood
and laminated members, with an emphasis
on lateral force design. Computer solutions
introduced. Prerequisite: CE 341 with grade "C" or
better.

CE 449 Bridge Design
(W)(3-3-4)
Design and analysis of short and medium-
span highway bridge superstructures includ-
ing reinforced concrete, slab bridges, steel
deck girder bridges, and prestressed concrete
bridges. Software applications.
Prerequisites: CE 341 with grade "C" or
better.

CE 450 Transportation Structures
(S)(2-3-3)
Design and analysis of common transpor-
tation structures including culverts, sign
structures, light poles, and railings according
to current AASHTO provisions and ODOT
procedures. Software applications.
Prerequisites: CE 341 with grade "C" or
better.

CE 456 Pavement Engineering
(S)(2-3-3)
Hot mixed asphalt materials testing and
mixture design. Methods of manufacture,
transport and placement of rigid and flexible
pavements. Structural design of rigid and
flexible pavements. Pavement
rehabilitation and management.
Prerequisites: CE 212, ENGR 213 and CE
351, each with grade "C" or better.

CE 457 Transportation and Land
Development
(W)(2-3-3)
Study of interactions between land develop-
ment activity and the transportation network.
Application of planning and engineering
design techniques to manage the impacts
of development upon the transportation system.
Prerequisite: CE 354 with grade "C" or
better.

CE 458 Transportation Safety
(W)(4-0-4)
Safety concepts in highway engineering
including highway design, operation, and
maintenance, as well as human factors, statisti-
cal analysis, traffic control and public policy.
Design concepts of intersections, interchang-
es, signals, signs and pavement markings.
Pre-requisite: CE 354 with grade "C" or
better.

CE 468 Travel Demand Modeling
(W)(3-3-4)
Introduction to travel demand analysis and
forecasting. Models studied from a theo-
retical, applied and practical perspective.
Students will become familiar with the tra-
ditional four-step travel forecasting process,
including model development, application
and interpretation of outputs.
Pre-requisites: CE 351 with grade "C" or
better.

CE 472 Hydrometry
(F)(2-3-3)
Measurement of variables in the hydrologic
cycle. Principles, methods, instruments, and
equipment for obtaining surface and ground
water quantity and quality data in nature
to support design and water management
efforts.
Pre-requisite: CE 374 with grade "C" or
better.

CE 473 Groundwater
(W)(3-0-3)
Offers an introduction to the physical prop-
erties and principles of groundwater. Topics
include groundwater and the hydrologic
cycle, fundamental fluid flow laws, ground-
water resource evaluation, and groundwater
contamination.
Prerequisite: CE 311 with grade "C" or
better.

CE 476 Applied Hydraulic Design
(W)(2-3-3)
Flow analysis for constructed channels;
principles of hydraulic design of culverts,
bridge waterway openings, highway inlets,
rundowns, and appurtenant water control
structures. Computer modeling of bridge and
culvert hydraulics. Design of appropriate Best
Management Practices (BMPs) for storm-
water quality and erosion control. Design
project.
Prerequisite: CE 374 with grade "C" or
better.

CE 481 Environmental Engineering I
(F,W)(3-0-3)
Introduction to environmental engineering
principles, fundamental concepts and sup-
porting calculations. Physical, chemical and
biological elements of the natural environ-
ment. Environmental impacts of anthropo-
genic activities. Control and pollution
prevention technologies. Legal
and regulatory framework governing environ-
mental management.
Prerequisites: CHE 221 and ENGR 318,
each with grade "C" or better.

CE 489 Treatment Wetlands
(W)(3-0-3)
Treatment wetland features; biological,
chemical and physical properties. Planning,
design and performance assessment principles
for municipal, agricultural and stormwater
treatment wetlands. Considers vegetation
and regulatory framework governing environ-
mental management.
Prerequisites: CHE 221 and ENGR 318,
each with a grade "C" or better.

CE 499 Independent Studies
(Hours to be arranged each term.)

CE 501 Civil Engineering Graduate
Seminar
(S)(1-0-1)
Civil Engineering graduate students will
meet regularly with faculty members to share
progress on their graduate project selection
and report writing.
Prerequisite: Advisor Consent
Courses with the following notation fulfill the appropriate general education requirements:

**C** - Communication  **H** - Humanities  **HP** - Humanities Performance  **SS** - Social Science

For more information, see page 31
CE 571 Open-Channel Hydraulics
(S)(3-3-4)
Application of basic principles of hydraulics to open channel flow. Theory and analysis of critical, uniform, unsteady, and gradually and rapidly varied flow. Flow characteristics in natural and constructed channels. Computer modeling of open-channel flow systems. Floodplain delineation methods. Prerequisites: CE 371 with grade “C” or better.

CE 572 Hydrometry
(F)(2-3-3)
Measurement of variables in the hydrologic cycle. Principles, methods, instruments, and equipment for obtaining surface and ground water quantity and quality data in nature to support design and water management efforts. Prerequisite: CE 374 with grade “C” or better.

CE 574 Environmental River Mechanics
(2-3-3)
River response to watershed modification and infrastructure, including introduction to fluvial geomorphology, sediment transport and stream restoration. Management of waterways and floodplains. Prerequisite: CE 374 with grade “C” or better.

CE 576 Applied Hydraulic Design
(2-3-3)
Flow analysis for constructed channels; principles of hydraulic design of culverts, bridge waterway openings, highway inlets, runnards, and appurtenant water control structures. Computer modeling of bridge and culvert hydraulics. Design of appropriate Best Management Practices (BMPs) for storm-water quality and erosion control. Design project. Prerequisite: CE 374 with grade “C” or better.

CE 586 Water and Wastewater Treatment
(4-0-4)
Water and wastewater characteristics, chemistry, quality and supply. Engineering design and water demand projection. Theory of individual treatment processes, design guidelines for components for water/wastewater treatment. Prerequisites: CHE 221 and CE 371, each with grade “C” or better.

CE 587 Environmental Remediation Technologies
(3-0-3)

CE 590 Civil Engineering Graduate Project
(F,W,S)(Vary 1-9)
Research and preparation pertaining to the master’s project. Prerequisite: Advisor consent.

(CHE) Chemistry
CHE 101 Introduction to General Chemistry
(F,W,S)(3-0-3)
A brief presentation of introductory chemical concepts including atomic structure, the chemical equation, the behavior of gases, the chemistry of solution and acid-base chemistry. For students with good knowledge of algebra. Pre- or corequisite: MATH 100. Corequisite: CHE 104 (lab).

CHE 102 Introduction to Organic Chemistry
(W)(3-0-3)
A continuation of CHE 101 with emphasis on organic chemistry. The role of organic chemistry in life and industrial processes is discussed. Prerequisite: CHE 101 with grade “C” or better or instructor consent. Corequisite: CHE 105 (lab).

CHE 103 Introduction to Biochemistry
(S)(3-0-3)
A continuation of CHE 102 with emphasis on biochemistry. The organic chemistry of biochemicals including proteins, carbohydrates and fats, as well as nucleic acids is discussed. Basic elements of metabolism are also explored. Prerequisite: CHE 102 with grade “C” or better or instructor consent. Corequisite: CHE 106 (lab).

CHE 104 Introduction to General Chemistry Laboratory
(F,W,S)(0-3-1)
Lab accompanying class content in CHE 101. Corequisite: CHE 101.

CHE 105 Introduction to Organic Chemistry Laboratory
(W)(0-3-1)
Lab accompanying class content in CHE 102. Corequisite: CHE 102.

CHE 106 Introduction to Biochemistry Laboratory
(S)(0-3-1)
Lab accompanying class content in CHE 103. Corequisite: CHE 103.

CHE 107, CHE 207, CHE 307, CHE 407 Seminar
(Hours to be arranged each term.)

CHE 201 General Chemistry I
(F)(3-0-3)
Atomic structure, chemical compounds, chemical equations and reaction stoichiometry, reactions in aqueous solution (including acid/base, redox, and precipitation reactions) gas laws and kinetic-molecular theory, and thermochemistry. Emphasis on engineering applications. Prerequisite: CHE 101 and 104, or high school chemistry or equivalent. Pre- or co-requisite: MATH 111. Corequisite: CHE 204 (lab).

CHE 202 General Chemistry II
(W)(3-0-3)
Electronic structure of atoms, periodic trends, chemical bonding, molecular geometry, intermolecular forces, phase transitions, and properties of solutions. Emphasis on engineering applications. Prerequisite: CHE 201 and CHE 204, or CHE 221 Corequisite: CHE 205 (lab).

CHE 203 General Chemistry III
(S)(3-0-3)
Chemical kinetics and equilibrium, applications of aqueous equilibria (including acid-base reactions, buffers, solubility, and complexation reactions), thermodynamics, entropy and free energy, electrochemistry, and nuclear chemistry. Prerequisite: CHE 202 and CHE 205, or
CHE 222
Corequisite: CHE 206 (lab)

CHE 204 General Chemistry I
Laboratory
(F)(0-3-1)
Laboratory experiments to accompany CHE 201.
Corequisite: CHE 201

CHE 205 General Chemistry II
Laboratory
(W)(0-3-1)
Laboratory experiments to accompany CHE 202.
Corequisite: CHE 202

CHE 206 General Chemistry Laboratory
(S)(0-3-1)
Laboratory experiments to accompany CHE 203.
Corequisite: CHE 203

CHE 210 Clinical Pharmacology
(F)(3-0-3)
The drug action of selected pharmaceutical. Emphasis is placed on drug interactions, routes of administration and effects on body systems.
Prerequisites: BIO 231, BIO 232.

CHE 221 General Chemistry I
(F)(4-3-5)
Atomic structure, chemical compounds, chemical equations and reaction stoichiometry, reactions in aqueous solution (including acid/base, redox, and precipitation reactions) gas laws and kinetic-molecular theory, and thermodynamics. Includes lab component.
Prerequisite: CHE 101 and CHE 104, or high school chemistry or equivalent. Pre- or Corequisite: MATH 111

CHE 222 General Chemistry II
(W)(4-3-5)
Electronic structure of atoms, periodic trends, chemical bonding, molecular geometry, intermolecular forces, phase transitions, and properties of solutions. Includes lab component.
Prerequisite: CHE 221, or CHE 201 and CHE 204

CHE 223 General Chemistry III
(S)(4-3-5)
Chemical kinetics and equilibrium, applications of aqueous equilibria (including acid-base reactions, buffers, solubility, and complexation reactions), thermodynamics, entropy and free energy, electrochemistry, and nuclear chemistry. Includes lab component.
Prerequisite: CHE 222, or CHE 202 and CHE 205

CHE 260 Electrochemistry for Renewable Energy Applications
(S)(3-3-4)
Development of electrochemistry concepts, including thermodynamics, reaction kinetics, charge transport and mass transport. Topics are presented in the context of fuel cells, electrolysis, electroplating and batteries. Also discussed, the chemistry of hydrogen; its properties, production, storage and transportation.
Prerequisite: CHE 202 or CHE 222.

CHE 305 Nanoscience and Nanotechnology
(F)(4-0-4)
Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.
Prerequisites: PHY222 or PHY223, and CHE202 or CHE222

CHE 315 Environmental Chemistry and Toxicology
(S)(3-0-3)
Mechanisms and toxicological effects of chemical reactions in water, soil and air. Global and regional concerns about atmospheric and marine contaminants, thermal pollution, pesticide and heavy metal disposal, radioisotope properties and effects of pollutants on living organisms. Organic nomenclature and selected biochemistry principles.
Prerequisite: CHE 331 or instructor consent.

CHE 325 Soil Science
(S)(3-3-4)
Prerequisite: CHE 202 or instructor consent.

CHE 331 Organic Chemistry I
(F)(3-3-4)
The structures and reactions of carbon compounds with emphasis on thermodynamics, reaction pathways and spectroscopy.
Prerequisite: CHE 223 or CHE 203 and CHE 206.

CHE 332 Organic Chemistry II
(W)(3-3-4)
Organic stereochemistry with emphasis on biologically important molecules.
Prerequisite: CHE 331.

CHE 333 Organic Chemistry III
(S)(3-3-4)
Free radical chemistry, pharmaceutical chemistry and the mechanistic aspects of enzymatic catalysis.
Prerequisite: CHE 332.

CHE 341 Instrumental Methods/Data Acquisition I
(3-3-4)
An introduction to the theory and practical applications of computer/instrument interfacing and data acquisition techniques and software. Includes a survey of optical measurement techniques.
Prerequisite: CHE 235. Corequisite: MIS 115 or CST 116 or instructor consent.

CHE 342 Instrumental Methods/Data Acquisition II
(3-3-4)
Principles and techniques of instrumental methods and data analysis. Methods appropriate for chemical analysis including spectroscopy, gas chromatography, potentiometric and flame photometric methods. Emphasis on sample preparation, instrumental response, sensitivity and accuracy.
Prerequisite: CHE 341.

CHE 345 Corrosion Chemistry
(S)(3-0-3)
A survey of the chemical kinetics and thermodynamics of corrosion, the various types of corrosion, inhibition of corrosion and industrial applications.
Prerequisites: CHE 101, CHE 201 or CHE 221, and PHY 202 or instructor consent.

CHE 346 Corrosion Chemistry Laboratory
(S)(0-3-1)
Laboratory accompanying CHE 345. Providing practical experience with electrochemi-
CHE 350 Clinical Pharmacology for Nuclear Medicine
(F)(3-0-3)
Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with commonly prescribed drugs, their clinical application, mechanism of action and side effects. Emphasis is on drugs of importance to nuclear medicine and the common radio-pharmaceuticals.
Prerequisite: BIO 233 or BIO 333 or instructor consent.

CHE 360 Clinical Pharmacology for the Health Professions
(F,W,S)(3-0-3)
Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with the most commonly prescribed drugs, their clinical application, mechanism of action and side effects.
Prerequisite: BIO 233 or BIO 333 or instructor consent.

CHE 450 Biochemistry I
(F)(3-3-4)
Molecular and cellular biochemistry with emphasis on DNA structure, replication, the process and cellular regulation of RNA transcription, and analyzing and constructing DNA.
Prerequisites: BIO 213, CHE 332.

CHE 451 Biochemistry II
(W)(3-3-4)
Molecular biochemistry with emphasis on protein conformation and function, mechanisms of enzyme action and control, and energy production via glycolysis.
Prerequisite: CHE 450.

CHE 452 Biochemistry III
(S)(3-3-4)
Molecular and cellular biochemistry with emphasis on cell membranes, lipid metabolism, aerobic energy metabolism, anabolism and the role of biochemistry in cellular signaling processes.
Prerequisite: CHE 451.

CHE 455 Water Quality Technology
(2-3-3)
Examination of water quality relative to surface, groundwater and industrial sources. Focus on laboratory and field procedures for detection, surveillance and abatement of water pollution.
Prerequisites: ENV 325 and CHE 342, or instructor consent.

CHE 465 Fate and Transport of Pollutants
(S)(3-3-4)
Mass balance. The use of equilibrium and chemical kinetics in the modeling of pollutant transport in water, soil and air. Mixing zone analysis, the use of Darcy's law, flow nets and the Gaussian Plume approximation. Discussion, development and use of selected modeling scenarios.
Prerequisites: MATH 252, CHE 223 or CHE 203 and CHE 206.

(CLS) Clinical Laboratory Science

CLS 100 Introduction to Clinical Laboratory Science
(S)(1-3-2)
Orientation to the theory and practice of all aspects of the clinical laboratory science profession. The history of clinical laboratory science, professional organizations and career opportunities are discussed.

CLS 107, CLS 207, CLS 307, CLS 407 Seminar
(Hours to be arranged each term.)

CLS 415 Clinical Chemistry I
(F)(5-3-6)
Fundamentals of chemical analysis of body fluids. Laboratory practice in chemical formats, data evaluation, laboratory utilization, and quality control theory. Laboratory exercises linked to lectures: renal and liver function, porphyrins, hormones, pregnancy, fetal development, bone metabolism, nutrition, and geriatrics.
Pre-requisite: CLS 415

CLS 417 Clinical Chemistry III
(Su)(2-0-2)
The theory, practical application and technical performance of chemical analysis. Emphasis on theory of therapeutic drug monitoring, toxicology, proteomics, individualized screening, and method validation.
Pre-requisite: CLS 416

CLS 420 Clinical Immunology and Infectious Serology
(F)(4-3-5)
Lecture/laboratory coverage of human immunity, including innate and adaptive immunity, immune system organs, tissues, and activation. Immunological methods used in the clinical lab to assess human immune response in health and in various disease states are studied.
Co-requisite: CLS 432

CLS 422 Molecular Diagnostic Methods
(S)(2-3-3)
Coverage of molecular techniques used in the clinical laboratory to diagnose disease. Topics covered include principles of molecular biology, nucleic acid isolation, purification, amplification, quantitation, and discrimination. Specimen collection/handling, ethical issues and molecular lab operations are also covered.
Prerequisites: CLS 415, CLS 416, CLS 420

CLS 424 Hemostasis
(Su)(2-3-3)
Lecture and laboratory coverage of the mechanisms of hemostasis and basic pathophysiology of hemostatic disorders. Students perform laboratory procedures pertaining to hemostasis, interpret results and correlate with other laboratory data to identify disease states.

CLS 432 Foundations of Clinical Laboratory Science I
(F)(3-3-4)
The first of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Lecture and lab emphasis on application of theories and concepts underlying professional practice in the contemporary clinical laboratory.
Prerequisite: MATH 361 or permission of the instructor or admission to the CLS program
**CLS 442 Hematology I**  
(W)(4-6-6)  
Lecture and lab coverage of normal development and function of blood cells. Students learn to evaluate normal and abnormal blood cell morphology through microscopic examination of blood smears. Students perform laboratory procedures pertaining to hematology.  
Prerequisites: CLS 420, CLS 442

**CLS 443 Immunohematology I**  
(S)(3-3-4)  
Lecture and lab coverage of immunohematology with practical application in the contemporary blood bank laboratory. Topics covered include blood groups biochemistry, genetics, and immunology, test methods and transfusion practices including donor selection, component preparation, quality management and compliance issues.  
Prerequisites: CLS 420, CLS 432

**CLS 444 Microbiology I**  
(W)(4-6-6)  
Lecture/lab coverage of human bacterial pathogens seen in the clinical laboratory including gram positive and gram negative cocci, and gram positive and gram negative bacilli. Principles and methods of critical microbiology laboratory diagnosis of bacterial diseases are studied.

**CLS 445 Microbiology II**  
(S)(2-6-4)  
Lecture/lab coverage of diseases caused by, and clinical laboratory identification of, human microbial organisms including anaerobes, spirochetes, mycobacteria, chlamydia, and rickettsia. Interpretation of clinical specimens, identification of pathogens, and the recognition of normal flora is also studied.  
Prerequisites: CLS 444, CLS 464, CLS 474

**CLS 446 Microbiology III**  
(S)(2-6-4)  
Lecture and laboratory coverage of normal and pathogenic parasitic organisms of man with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

**CLS 447 Clinical Chemistry Laboratory**  
(W)(4-6-6)  
Principles of chemical analysis, quality control, laboratory utilization, and safety. Hands-on exercises, demonstrations, and computer tutorials illustrating chemical analysis and data evaluation in a clinical chemistry laboratory. Discussion of case studies using problem-solving methods to analyze and interpret relevant chemical analysis data. Corequisite: CLS 415

**CLS 448 Infectious Serology**  
(Su)(0-3-1)  
Clinical laboratory diagnosis of infectious disease by serological test methods is studied.  
Prerequisites: CLS 420, CLS 432.

**CLS 449 Principles of Urinalysis**  
(Su)(2-3-3)  
Lecture and laboratory coverage of renal function, urine formation, and methods used to analyze urine in the medical laboratory. Students perform physical, chemical, and microscopic analyses on clinical samples and correlate results with states of health and disease in man.

**CLS 452 Hematology II**  
(S)(4-3-5)  
Comprehensive study of the pathophysiology of hematological disorders. Students perform microscopic examination of blood films, interpret results and correlate with other laboratory data to identify disease states.  
Prerequisite: CLS 442.

**CLS 453 Immunohematology II**  
(Su)(1-3-2)  
Continued study of immunohematology emphasizing clinical decision-making and problem-solving related to blood banking and transfusion therapy practices.  
Prerequisite: CLS 443.

**CLS 454 Advanced Chemistry/Immunology Concepts**  
(Su)(2-0-2)  
Directed study, review, and class discussion of clinical laboratory assay methodology and data interpretation, and medical research methods including data analysis, regulatory requirements, and ethical issues. Relevant medical case studies and contemporary scientific research papers are presented and critiqued by students.  
Prerequisites: CLS 415, CLS 416, CLS 420, and CLS 447

**CLS 455 Foundations of Clinical Laboratory Science II**  
(W)(1-3-2)  
The second of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Lecture and lab emphasis on application of theories and concepts underlying professional practice in the contemporary clinical laboratory.  
Prerequisite: CLS 432

**CLS 463 Foundations of Clinical Laboratory Science III**  
(F)(1-3-2)  
Third of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Emphasis on practical experience through the application of theories and concepts of professional development, administration and supervision at an approved off-campus clinical site.  
Prerequisite: CLS 432 and CLS 462

**CLS 464 Medical Mycology and Virology**  
(F)(1-3-2)  
Lecture and laboratory coverage of pathogenic fungal and viral organisms with emphasis on those seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.  
Prerequisites: Admittance to CLS Program

**CLS 470 Chemistry and Immunology Externship**  
(F)(0-12-4)  
Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical chemistry/immunology laboratory and further develop discipline-specific competency.  
Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

**CLS 471 Hematology Externship**  
(F)(0-12-4)  
Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical hematology laboratory and further develop discipline-specific competency.  
Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.
**CLS 472 Microbiology Externship**  
(F)(0-12-4)  
Four weeks full-time practical experience at an approved off-campus clinical site. Emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical Microbiology laboratory and further develop discipline-specific competency.  
Prerequisite: Successful completion of all didactic, pre-clinical coursework in the CLS program.

**CLS 473 Immunohematology Externship**  
(F)(0-9-3)  
Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary blood bank laboratory and further develop discipline-specific competency.  
Prerequisite: Successful completion of all didactic, pre-clinical coursework in the CLS program.

**CLS 474 Medical Parasitology**  
(W)(1-3-2)  
Lecture and laboratory coverage of normal and pathogenic parasitic organisms of humans with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.  
Prerequisites: Admittance to CLS Program.

**COM 104 Introduction to Communication**  
(F)(3-0-3)  
Introduces Communication Studies. Principles and applications developed in context of career exploration, interpersonal, group, organizational and technical communication. Includes history and structure of communication field, career paths, research skills and role of technology. Required for majors.

**COM 105 Introduction to Communication Theory**  
(W)(3-0-3)  
Introduces basic theories and concepts in the Communication discipline. Acquaints students with major theories fundamental to communication research and to communication interactions including interpersonal, organizational, media and intercultural.  
Prerequisite: COM 104.  
Pre- or corequisite: WRI 122.

**COM 106 Introduction to Communication Research**  
(S)(3-0-3)  
Introduces research in the Communication discipline. Students find and analyze quantitative, qualitative and critical research. Introduces communication research as a process composed of methods, data-gathering, analysis, conclusions.  
Prerequisite: COM 105.

**COM 107, COM 207, COM 307, COM 407 Seminar**  
(Hours to be arranged each term.)

**COM 109 Introduction to Communication Technology**  
(S)(2-3-3)  
Introduction to the use of communication technology. Emphasis on the use of various communication technologies including social media, instant messaging, and visual communication technologies. Features projects using technology to effectively communicate to various audiences.

**COM 115 Introduction to Mass Communication**  
(F)(3-0-3)  
Provides an introduction to mass media. Focuses on understanding how media operate with emphasis on contemporary social, economic, political, cultural and ethical issues.

**COM 205 Intercultural Communication**  
(F,W,S)(3-0-3) C  
Introduces basic theories and concepts of intercultural communication. Builds understanding and skills enabling students to analyze intercultural interactions and develop and practice effective communication strategies.

**COM 215 Creativity in Communication**  
(F,W,S)(3-0-3)  
Define and learn how personal and group creativity can be enhanced. Study the lives of creative individuals in the arts, sciences, and industry. Individual and group exercises designed to enhance the creative process.

**COM 216 Essentials of Grammar and Punctuation**  
(W)(3-0-3)  
Involves learning basic and advanced grammar and punctuation to provide a firm foundation for any type of writing.  
Prerequisite: WRI 121 with grade “C” or better.

**COM 225 Interpersonal Communication**  
(F,W,S)(3-0-3) C  
Introduces interpersonal communication theory and practice. Students apply course concepts to analyze and practice dyadic communication to develop more effective work and personal relationships.

**COM 226 Nonverbal Communication**  
(W)(3-0-3)  
Nonverbal aspects of human communication. Examines the relationships between nonverbal and verbal communication behavior and nonverbal communication skill. Topics include space, distance, environment, touch, gesture, facial expression and gaze as communication.  
Prerequisites: COM 225, SPE 111.

**COM 237 Introduction to Visual Communication**  
(S)(3-0-3)  
Introduces theory and rhetoric through several perspectives: personal, historical, technical, ethical, cultural, and critical. Emphasizes relationships between form/content, word/image, and societal role of visual communication.  
Prerequisite: WRI 122.

**COM 248 Digital Media Production**  
(S)(2-3-3)  
Study of the technical aspects of digital media design and production. Hands-on experience in creating and editing video and audio. Production of video and audio for specific contexts.

**COM 255 Communication Ethics**  
(S)(3-0-3)  
Examines typical communication situations involving ethics. Provides methodologies for critically evaluating ethical situations. Uses case approach with emphasis on application.  
Prerequisite: WRI 122.

**COM 256 Public Relations**  
(F)(3-0-3)  
Introduces history and practice of public
Courses with the following notation fulfill the appropriate general education requirements:

- Communication (C)
- Humanities (HP)
- Humanities Performance (HP)
- Social Science (SS)

For more information, see page 31
Hands-on experience with graphics, digital/audio video, animation and text. Prerequisites: CST 101 or equivalent, SPE 111 and WRI 227.

COM 420 Externship
(F,W,S)(Variable to a total of 15 credits)
Students work in applied settings in their emphasis under the supervision of an on-site mentor. Regular contact with extern advisor. Written externship reports required. Prerequisite: Senior standing.

COM 421 Senior Project I
(F,W)(3-0-3)
Allows students to initiate research on a significant capstone project in the communication field. Focuses on development of a proposal and presentation. Prerequisite: Senior standing.

COM 422 Senior Project II
(W,S)(3-0-3)
Continues work of COM 421, focusing on project research methodologies. Prerequisite: COM 421.

COM 423 Senior Project III
(E,S)(3-0-3)
Focuses on completion of project, including final documentation and presentation. Prerequisite: COM 422.

COM 424 Capstone Course
(F)(3-0-3)
Communication Studies majors complete a significant research project that bridges education with future profession or graduate school. Students collaboratively produce a project or portfolio reflecting strong critical thinking and application of communication theory and practice. Project topics vary by instructor. Prerequisites: Senior standing in the major. WRI 227

COM 425 Mediation
(W)(3-0-3)
Prepares students to mediate in public and private settings. Covers conflict management strategies, processes and issues including gender and cultural awareness. Prerequisite: COM 225 or instructor consent.

COM 426 Mediation Practicum
(S)(Variable Credit 1-3)
Mediation practice and observation with experienced mediators through the Klamath Mediation Center. Students will progress from observation, to co-mediation, and finally, mediation of real disputes. Builds on the theoretical insights and practice of COM 425.

COM 427 Communication Training and Development
(S)(3-0-3)
Prepares students to facilitate communication skills workshops and differentiate between organizational structure and communication training needs. Topics include audience analysis, learning theory, curriculum design, presentation skills, classroom dynamics and assessment. Prerequisite: SPE 321.

COM 445 Organizational Communication II
(S)(3-0-3)
Examines organizational communication systems and the design of communication audit procedures. Synoptic reports of findings and recommendations. Prerequisite: COM 345 or instructor consent.

COM 446 Communication and Leadership
(W)(3-0-3)
Explores the relationship between communication and leadership within organizations and the development and application of communication competencies associated with effective leadership. Prerequisite: SPE 321 or instructor permission.

(CSH) Clinical Sleep Health

CSH 201 Human Development and Behavioral Health
(F,W,S)(3-0-3)
Normal sleep architecture over the lifespan. Behavioral, physiological, and environmental patterns that contribute to healthy sleep.

CSH 220 Sleep Disorders and Co-Morbidities
(F,W,S) (3-0-3)
Pathophysiology, epidemiology, and clinical presentation of abnormal sleep. Understanding and recognition of major co-morbidities associated with sleep disorders.
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication   H - Humanities   HP - Humanities Performance   SS - Social Science

**CST (Computer Systems Engineering Technology)**

**CST 102 Introduction to Computer Systems**
*(F)(2-3-3)*
Concepts, terms, and trends related to the computer engineering technology (hardware) and software engineering technology (software) curriculums. Includes discussions on fundamental aspects of the computer field. Laboratory component will introduce students to micro-computers, programming concepts and various computer/engineering related software. Prerequisite: CSET major or instructor consent.

**CST 107, CST 207, CST 307, CST 407 Seminar**
*(Hours to be arranged each term.)*

**CST 116 C++ Programming I**
*(F,W,S)(3-3-4)*
Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed MIS 116. Pre- or Corequisite: MATH 111.

**CST 120 Embedded C**
*(S)(3-3-4)*
C programming concepts for embedded platforms such as cross-compilation, storage classes, dynamic memory allocation, bitwise operations and masking. Embedded systems topics such as I/O ports, interrupts, timers and hardware interfacing will also be explored. Pre- or Corequisite: CST 126

**CST 126 C++ Programming II**
*(F,W,S)(3-3-4)*
Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed MIS 126. Prerequisite: CST 116, with grade "C" or better.

**CST 130 Computer Organization**
*(W,S)(3-0-3)*
Introduces computer elements, organization, and instruction sets, computer arithmetic, ALU, Registers, Datapath, memory and Control unit functions. Prerequisite: CST 162 with grade "C" or better.

**CST 131 Computer Architecture**
*(E,S)(3-0-3)*
Continuation of CST 130. Topics include main memory, cache, virtual memory, memory management, secondary storage, networks, operating system functions, and pipelining. Prerequisite: CST 130 with grade "C" or better.

**CST 133 Digital Logic II**
*(F,W)(3-3-4)*
Introduction to sequential logic, latches, flip-flops, registers, counters, timers, finite state machines. Implementation in programmable logic devices using HDL. DC and AC parameters, timing analysis. Laboratory is integral to class. Prerequisite: EE 131 or CST 162, both with grade "C" or better

**CST 134 Instrumentation**
*(F,W)(0-3-1)*
Lecture/laboratory course that provides students experience in measuring, calibrating, and testing digital and analog systems. Uses various test equipment for test and measurement of digital and analog components. Pre- or Co-requisite: CST 133.

**CST 136 Object-Oriented Programming with C++**
*(F,W,S)(3-3-4)*
A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed MIS 136. Prerequisite: CST 126, with grade "C" or better.

**CST 162 Digital Logic I**
*(F,W)(3-3-4)*
Introduction to combinational logic. Includes introduction to number systems, Boolean algebra, logic gates, Muxes, Decoders, Adders, Subtracters. Logic design using a hardware description language. Laboratory integral to the class. Pre- or corequisite: MATH 100.

**CST 204 Introduction to Microcontrollers**
*(F,W,S)(3-3-4)*
An introduction to microcontrollers (uC). Signals and data flow within simple systems. Introduction to instruction set, software development tools and I/O techniques, both programmed and interrupt-driven. Experiments using uC plus external circuits in applications. Prerequisites: CST 131, CST 250, each with grade "C" or better, or instructor consent.

**CST 211 Data Structures**
*(F,W,S)(3-3-4)*
Discussion of efficient methods of data representation such as stacks, queues, linked-lists, binary trees, B-trees. Emphasis is on data representation and algorithm analysis. Prerequisite: CST 136 with grade "C" or better.

**CST 223 Concepts of Programming Languages**
*(S)(2-3-3)*
Study of principles and fundamental concepts characterizing high-level programming languages, including history and survey of programming paradigms, syntax and semantic rules, data types, control flow and data abstraction. Prerequisite: CST 126 with grade "C" or better.

**CST 229 Introduction to Grammars**
*(F)(3-0-3)*
The concepts involving alphabet words and languages will be discussed. Related topics in automata and regular expression will be explored. Emphasis is on context free grammars, parse tree and parsing techniques. Prerequisites: CST 211, and CST 223 or CST 231.

**CST 231 Digital Systems Design I**
*(W)(3-3-4)*
Concepts, terminology and techniques in design and implementation of digital system components. Synchronous sequential logic design with emphasis on state machines. System design process including synthesis using Verilog HDL and implementation in programmable logic devices. Lab integral to course.
Prerequisite: CST 133 with grade "C" or better.

CST 236 Software Systems Testing
(F,W,S)(3-3-4)
Focus on software testing and reliably monitoring the health of software development. Topics include test driven development, story driven tests, unit tests, Web tests, load tests, static code analysis and dynamic code analysis.
Prerequisite: CST 136 with grade "C" or better.

CST 238 Graphical User Interface Programming
(S)(3-3-4)
Introduction to HCI and GUI design in a rapid application development environment. Prerequisite material in delegation, events, and multithreaded programming included. Topics: forms, containers, components, controls, modal/modelless windows, fixed/dynamic layouts, SDI/MDI applications, application internationalization, and data binding.
Prerequisites: CST 211 with grade "C" or better and SPE 111.

CST 240 UNIX
(W,S)(3-3-4)
Students will study the structure of the UNIX/Linux Operating System, including: file structure, input/output processing, commands and utilities, shell configuration, communications, and script programming languages. Emphasis will be placed on lab work done within the UNIX/Linux environment.
Prerequisite: CST 126 with grade "C" or better.

CST 250 Computer Assembly Language
(F,W)(3-3-4)
Concepts of assembly language programming applied to a modern computer; data and instruction formats, address generation; data definition, storage allocation and program control statements; sub-routine library; CPU instruction set; control records; and writing of sub-routines.
Prerequisites: CST 126 and CST 130 with grade "C" or better.

CST 262 Digital Design Using HDL
(F,W)(3-3-4)
Advanced digital circuit design. HDL is used in designing sequential logic circuits such as registers, counters, and synchronous finite state machines. Basic digital circuit design and analysis with semiconductor devices is also covered. Laboratory is integral to the class.
Prerequisites: CST 162 with grade "C" or better, EET 101, EET 102.

CST 276 Software Design Patterns
(F)(3-3-4)
Design patterns establish a common terminology allowing developers to use a common vocabulary and share a common viewpoint of the problem. Design patterns provide a common point of reference during the analysis and design phase of a project.
Prerequisite: CST 136 with grade "C" or better.

CST 315 Embedded Sensor Interfacing and I/O
(F)(3-3-4)
Prerequisites: CST 204; EE 221

CST 316, CST 326, CST 336 Junior Team-Based Project Development I, II, III
(F,W,S)(3-3-4)
In this three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.
Prerequisite: CST 211 with grade "C" or better.

CST 320 Compiler Methods
(W)(3-3-4)
Basic concepts of compiler design and operation. Topics include lexical and syntactical analysis, parsing, translation, data flow analysis and code generation, and implementation of a small compiler.
Prerequisite: CST 229.

CST 321 Introduction to Microprocessors
(F)(3-6-5)
Hardware and assembly level software needed to interface a microprocessor to I/O ports, memory and interrupt sources. Topics include bus controller design, timing analysis, programmed I/O and interrupts. Extensive lab provides experience with system design, test and debugging using the 80386DX microprocessor.
Prerequisites: CST 204 and CST 231, with grade "C" or better, or instructor consent.

CST 324 Database Systems and Design
(F)(3-3-4)
An overview of Data Base Management Systems including requirements analysis methodology for data base design, conceptual DB design methodology including formulation of entity-relationship models, review of query language characteristics, and a comparison of commonly available DBMS. Prerequisite: CST 211 with grade "C" or better.

CST 328 Graphics, Games, and Simulations Programming
(S)(2-3-3)
Introduction to games and simulations programming using a high end game development engine. Graphics topics: geometric transformations, physics simulation, collision detection/handling, and ray tracing/casting. Artificial intelligence topics: game theory, probability, steering behaviors, flocking behaviors, path-finding, and behavior trees.
Prerequisite: CST 238 or instructor consent.

CST 331 Microprocessor Peripheral Interfacing
(W)(3-6-5)
Expansion of processor based systems through off chip parallel bus interfacing. Adding off chip I/O ports, memory and parallel I/O devices. I/O port expansion through serial interface. In depth interface timing analysis. Extensive lab provides continued experience with system design, test and debugging techniques.
Prerequisite: CST 337 or CST 321; CST 231 with grade "C" or better.

Courses with the following notation fulfill the appropriate general education requirements:
- Communication
- Humanities
- Humanities Performance
- Social Science

For more information, see page 31.
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
A three-term sequence giving the student major responsibility for planning and carrying out a computer-oriented project. Individual creativity will be encouraged by allowing the student to select an appropriate project.
Prerequisite: CST 334; CST 336 or CST 373.

**CST 415 Computer Networks**
(FW)(3-3-4)
Current issues in computer networks and distributed systems. Topics include network protocols, interface standards, and transmissions mode. Network layers detailing Internet Protocol Suite and correlations with 7 layer abstract communication model. Routing and WAN Architectures.
Prerequisite: CST 336 or CST 373 with grade "C" or better.

**CST 417 Embedded Networking**
(S)(3-3-4)
Prerequisite: CST 336 or CST 373 with grade "C" or better.

**CST 418 Data Communications and Networks**
(W)(3-0-3)
Provides students with an introduction to data communications and computer networks. Students acquire knowledge of communications components and their use in implementing a network. Emphasis is on the practical aspects of network configuration, operations, and detection, isolation and correction of problems.
Prerequisites: CST 204; EET 237 or EE 223.

**CST 420 Effective C++ and STL**
(2-3-3)
Emphasis is on techniques to apply the C++ language and library effectively toward the implementation of object-oriented systems. Specific ways to improve design and program will be covered as well as purpose and use of the C++ Standard Library.
Prerequisite: CST 320 or instructor consent.

**CST 426 Introduction to Artificial Intelligence**
(W)(3-0-3)
Concepts and techniques of AI with considerable use of the LISP interpreter. Includes discussion of "search" methods, knowledge representation, natural language processing, models of cognition, vision, and "The Blocks World."

**CST 435 Microprogramming**
(S)(3-0-3)
The concepts and methods involved in programming the computer's control unit. Coverage includes a review of computer organization, microprogram operations such as floating point arithmetic, translator/simulator development, and emulation techniques.
Prerequisite: Software Engineering Technology senior standing, or instructor consent.

**CST 441 Logic Synthesis with VHDL**
(F)(2-3-3)
This course will show students how to use the hardware description language, VHDL, with hierarchical design techniques to manage a complex design. In this process, students will create a design using the VHDL modeling tools, simulate the design using advanced simulation techniques, synthesize and test the design. Laboratory integral with the course.
Prerequisite: CST 351 or instructor consent.

**CST 442 Advanced Computer Architecture**
(W)(3-0-3)
Advanced concepts in computer architectures including pipelined, superpipelined, superscalar, and dynamically pipelined processor architectures, Parallel processors, Multiprocessors, Cache and Cache coherency.
Prerequisite: CST 344 or instructor consent.

**CST 445 Advanced Microprocessors and Applications**
(F)(3-3-4)
This class examines the architecture of the Motorola 680X0 microprocessor family. The course investigates advanced design techniques used in developing interfaces to the 680X0 microprocessor family, along with the use of coprocessors and special device controllers. Advanced design concepts in both software and hardware will be examined.
Prerequisite: CST 331 or instructor consent.

**CST 451 ASIC Design using FPGAs**
(W)(3-3-4)
FPGA senior project design specifications; presentation of the project in a design review to peers; application of formal hardware/software design techniques when designing with FPGAs and verification of FPGAs.
Prerequisite: CST 441 or instructor consent.

**CST 455 System On a Chip Design**
(F)(3-3-4)
Prerequisites: CST 345, CST 373.

**CST 456 Embedded System Testing**
(W)(3-3-4)
Testing of complete embedded systems including hardware and software. Topics include unit testing for both hardware and software, UVM testing framework for hardware and test driven design practices as they apply to both hardware and software.
Prerequisites: CST 136, CST 204, CST 231.

**CST 461 Advanced Topics in VLSI Design**
(S)(2-3-3)
Conclusion of a three-course sequence in Very Large Scale Integration design. This course focuses on testing methodology, especially boundary scan. In addition, an alternative synthesis tool is introduced. Current issues in VLSI design are discussed. Laboratory experiments form an essential part of the course.
Prerequisite: CST 441.

**CST 464 RISC-Based Microprocessor Systems**
(S)(3-3-4)
RISC architecture and applications. Includes i960 microprocessor features, instruction set, and i960 support software. Laboratory focus on applications.
Prerequisites: CST 331, CST 344.

**CST 465 Web Development with ASP.NET**
(WS)(2-3-3)
Dynamic Web site creation and development strategies using ASP.NET are discussed and practiced. Focus on the importance of databases in the creation of a dynamic Web site is heavily emphasized.
Pre- or corequisites: CST 324 and CST 365 or instructor consent.

**CST 466 Embedded System Security**
(S)(3-0-3)
Fundamental theories and applications of...
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

cryptography relevant to computer and embedded system security.
Prerequisites: CST 126, MATH 112.

(DH) Dental Hygiene

DH 100 Introduction to Dental Hygiene
(F)(1-3-2)
Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed. Hands-on activities involving basic dental hygiene skills. Opportunities to experience normal oral anatomy.

DH 101 Introduction to Dental Hygiene II
(W)(0-3-1)
Hands-on activities involving the procedures and skills learned in DH 100. Students will practice basic dental hygiene skills. Opportunities to experience normal oral anatomy. Prerequisite: DH 100.

DH 107, DH 207, DH 307, DH 407 Seminar
(Hours to be arranged each term.)
Review, discussion, evaluation, and problem solving of the students’ clinical experience.

DH 221, DH 222, DH 223 Dental Hygiene Clinical Practice and Seminar I, II, III
(221-F)(2-6-4)(222-W)(2-6-4)(223-S)(1-6-3)
Sequential courses designed to provide clinical skills essential for the practice of dental hygiene. Skill development of patient appraisal, basic instrumentation, and individualized preventive care emphasized. Special emphasis on children up to 12 years old.
Prerequisite: For DH 221–Admission to Dental Hygiene Program.
Prerequisite: For DH 222–DH 221.
Prerequisite: For DH 223–DH 222, CHE 360 and DH 252.

DH 225 Head and Neck Anatomy, Histology and Embryology
(F)(2-3-3)
Anatomy of head and neck integrated with histology and embryology of head neck structures, and oral and dental tissues.

DH 240 Prevention I
(F)(3-0-3)
Cariology, remineralization, fluorides, xerostomia, oral physiotherapy aids, plaque and calculus. Begin discussions about healthcare for the provider as a part of holistic healthcare.
Prerequisite: Admission to the Dental Hygiene Program.
Corequisite: DH 221.

DH 241 Prevention II
(W)(3-0-3)
Psychological theories pertaining to patient care, including motivational interviewing and patient communication techniques. Healthcare for the provider is continued to include but not be limited to computerized dietary analysis and dietary counseling techniques and wellness goals for the provider. Prerequisite: DH 240.

DH 242 Prevention III
(S)(3-0-3)
Preventive needs of infants through sixth grade. Sealants, early childhood caries, occlusion and nutrition, and management of this age group are considered. Healthcare for the provider is continued. Prerequisite: DH 241.

DH 244 General and Oral Pathology
(W)(3-0-3)
Introduction to general pathology and common oral pathologies. Basic pathology, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

DH 245 Oral Radiology I
(W)(2-3-3)
Theoretical background and practical application of dental radiography. Exposure techniques, processing, mounting, and evaluation of dental radiographs; physical principles of production; clinical use of X-radiation; and radiation safety procedures.

DH 245 Oral Radiology II
(S)(2-0-2)
Specialized techniques for children, special needs patients, extra-oral procedures, occlusal projections, localization techniques, radiographic detection and interpretation of potential pathology. Prerequisite: DH 244 and DH 252.

DH 254 Introduction to Periodontology
(S)(1-0-1)
Introduction to periodontology with emphasis on etiology and pathogenesis of periodontal disease, disease classification, and assessment procedures. Prerequisite: DH 244.

DH 267 Emergency Procedures
(S)(2-3-3)
Prevention, preparation, and management of emergency situations common in the dental environment. Individual and team practice in carrying out emergency procedures. Prerequisite: DH 244.

DH 275 Dental Ethics
(F)(2-0-2)
Professional ethics and legal requirements of the dental profession.

DH 299 Laboratory Practice
(Hours to be arranged each term.)

DH 321, DH 322, DH 323 Dental Hygiene Clinical Practice and Seminar IV, V, VI
(321-F)(2-6-4)(322-W)(1-6-3)(323-S)(1-12-5)
Continued development of dental hygiene skills, ultrasonic and advanced instrumentation, expanded functions and observation in specialty practices.
Prerequisite: For DH 321–DH 223.
Prerequisite: For DH 322–DH 321.
Prerequisite: For DH 323–DH 322.

DH 340 Prevention IV
(F)(3-0-3)
Recognition and promotion of positive oral health habits for adolescents. Eating disorders, orthodontics, tobacco cessation, and drug/alcohol concerns and their effect on the oral cavity. Sports guard use and fabrication. Mental and physical healthcare for the provider.
Prerequisite: DH 242.

DH 341 Prevention V
(W)(3-0-3)
Dental care for oral cancer patients. Examination of different antimicrobials and their use. The needs of geriatric patients and special needs patients. Healthcare for the provider. Prerequisite: DH 340.
DH 344 Advanced General and Oral Pathology  
(S)(3-0-3)  
Prerequisite: DH 244.

DH 351 Pain Management I  
(W)(1-3-2)  
Coordinated lecture and laboratory practice in the techniques of local anesthesia. Factors in selection of local anesthetics.  
Prerequisite: CHE 360 and DH 267.

DH 352 Pain Management II  
(S)(2-3-3)  
Recognition of dental anxiety; behavioral management; nitrous oxide sedation techniques are practiced. Health history evaluation and case analysis.  
Prerequisite: DH 351.

DH 354 Periodontology  
(F)(3-0-3)  
Evidence-based approach for treatment of periodontal disease including nonsurgical and surgical treatment. Root anatomy relating to effective instrument adaptation. Treatment planning for patients with all types of classifications of periodontal disease.  
Prerequisite: DH 254.

DH 363 Dental Materials  
(S)(2-6-4)  
General properties, composition and manipulation of common dental and restorative materials. Expanded functions including denture relines and amalgam polishing are practiced.

DH 366 Dental Anatomy  
(W)(2-0-2)  
In-depth study of crown and root morphology of primary and permanent dentitions with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

DH 370, DH 371, DH 372  
International Externship  
(S)(1-0-1)  
Sequential courses preparing for and providing dental hygiene care at an international site using portable dental equipment. Cultural issues, teamwork, financing, needs assessment, goal setting and delivery of program.  
Prerequisites: For DH 370–DH 321 and DH 381.  
Prerequisite: For DH 371–DH 370.  
Prerequisite: For DH 372–DH 371.

DH 380 Community Dental Health I  
(S)(1-3-2)  
Childhood education techniques provided and implemented within the community. Systemic fluoride and its controversial effects debated. Teamwork skills.  
Prerequisite: DH 241.  
Corequisite: DH 242.

DH 381 Community Dental Health II  
(F)(1-3-2)  
Needs assessments and budget developed along with a project plan for a community oral health project. Educating and working with adolescents. Projects will be conducted in local schools. Teamwork techniques practiced.  
Prerequisite: DH 380.

DH 382 Community Dental Health III  
(W)(1-3-2)  
The ongoing community oral health project will be implemented. Formative and summative evaluations compared and utilized in project. The dental hygienist’s role in managed care. The various structures, ethics, and alternatives of public health.  
Prerequisite: DH 381.

DH 383 Community Dental Health IV  
(S)(0-3-1)  
Conclusion, evaluation and future recommendations of community oral health project. Formal written presentation of project. In-depth look at geriatric clients and their needs. Students will experience different settings in the local geriatric community.  
Prerequisite: DH 382.

DH 399 Laboratory Practice  
(Hours to be arranged each term.)

DH 401 Overview of Advanced Dental Hygiene  
(F,W,S)(3-0-3)  
Introduction to the online degree completion program. Career opportunities, roles of the dental hygienist, and the different emphases within the program are explored.  
Prerequisite: Admission to BDHO program.

DH 421, DH 422, DH 423 Dental Hygiene Clinical Practice and Seminar VII, VIII, IX  
(421-SU)(2-6-4)(422-F)(1-12-5)(423-W)(1-12-5)  
Prerequisite: For DH 421–DH 323.  
Prerequisite: For DH 422–DH 421.  
Prerequisite: For DH 423–DH 422.

DH 430 Dental Hygiene Board Review  
(F)(2-0-2)  
Designed to help students prepare for their national board exam. Multiple-choice test-taking skills are practiced. Mock tests simulating the real exam are used.

DH 453 Current Issues in Dental Hygiene  
(S)(3-0-3)  
Current topics and issues related to dental hygiene practice are explored.  
Prerequisite: Admission to BDHO program.

DH 454 Dental Practice Management  
(F,W)(3-0-3)  
Profitability of the Dental Hygiene Department; practice models, office design; patient satisfaction; financing options for the patient. Technology’s impact on practice management.  
Prerequisite: DH 323.

DH 455 Dental Hygiene Research  
(F,W,S)(3-0-3)  
Students choose a topic, conduct library and clinical research and document results.  
Prerequisites: DH 453, MATH 243 and admission to BDHO program.

DH 461, DH 462, DH 463 Restorative Dentistry I, II, III  
(461-Su)(1-3-2)(462-F)(1-3-2)(463-W)(0-12-4)  
Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restoration on typodonts in Restorative Dentistry I and on patients in Restorative Dentistry II and III.
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities    HP - Humanities Performance    SS - Social Science

Prerequisite: for DH 461-DH 363.
Prerequisite: for DH 462-DH 461.
Prerequisite: for DH 463-DH 462.

**DH 467 Restorative Functions Endorsement**
(2-2-4)
This course fulfills the Oregon Board of Dentistry (OBD) requirements for the restorative endorsement for dental assistants and dental hygienists. Lecture, lab practice on typodonts and clinical practice with patients. Additional testing is required by the OBD following course completion.
Prerequisite: AS or BS in Dental Hygiene or EFDA (Expanded Function Dental Assistant).

**DH 470 Community Program Planning I**
(W)(2-3-3)
First in a two course sequence. Students identify a target population and work with the community to assess, analyze, plan and budget for a community health project. Requires communication skills, networking, critical thinking and research.
Prerequisite: AHED 450 and admission to BDHO program.

**DH 471 Community Program Planning II**
(ES)(1-6-3)
Second course in Community Program Planning sequence. Community projects planned in DH 470 are implemented and evaluated.
Prerequisite: DH 470 and admission to BDHO program.

**DH 475 Dental Hygiene Research Methods I**
(F)(3-0-3)
First in a two-course sequence. Course emphasizes evidence-based decision making, identifying clinical treatment questions, describing types of research designs and sources of evidence, discussing importance of statistics, and conducting computerized searches. Critical appraisal of research introduced.
Prerequisite: DH 323

**DH 476 Dental Hygiene Research Methods II**
(W)(3-0-3)
Second in a two-course sequence. Emphasis on analysis of research studies for validity, reliability, statistical and clinical significance, and bias. Given clinical questions, students will conduct searches, critically analyze, and write summaries/ reflections using EBDM guidelines.
Prerequisite: DH 475

**DH 477 Dental Hygiene Research Methods III**
(W)(2-0-2)
Third in a series of three courses focusing on evidence-based decision making and critical analysis of current literature. In small groups, students will research a clinical question in PICO format, conduct and analyze research, and write a Systematic Review.
Prerequisite: DH 476.

**DH 480 Community Health Practicum**
(S)(0-9-3)
Students gain practical experience in public health by working in a public health setting. Individual goals and objectives are set by the student in consultation with the instructor.
Prerequisite: AHED 450, DH 471, and admission to BDHO program.

**DH 495 Individual Studies**
(Hours to be arranged each term.)

**DH 499 Laboratory Practice**
(Hours to be arranged each term.)

**DHE (Extended)**

**DHE 100 Introduction to Dental Hygiene I**
(F.W.S)(2-0-2)
Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed.

**DHE 107, DHE 207, DHE 307 Seminar**
(Hours to be arranged each term.)

**DHE 211 Principles of Dental Hygiene I**
(F)(2-0-2)
Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.
Prerequisite: DHE 211.

**DHE 213 Principles of Dental Hygiene III**
(S)(3-0-3)
Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.
Prerequisite: DHE 212.

**DHE 221 Dental Hygiene Clinical Practice I**
(F)(0-9-3)
Sequential course designed to provide clinical skills essential for the practice of dental hygiene. Skill development in the areas of patient appraisal, basic instrumentation, and individualized preventive care emphasized.

**DHE 222 Dental Hygiene Clinical Practice II**
(W)(0-12-4)
Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.
Prerequisite: DHE 221 and CHE 360

**DHE 223 Dental Hygiene Clinical Practice III**
(S)(0-12-4)
Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.
Prerequisite: DHE 222.

**DHE 225 Head and Neck Anatomy, Histology and Embryology**
(W)(2-3-3)
Anatomy of head and neck integrated with histology and embryology of head neck structures, and oral and dental tissues.

**DHE 233 Periodontology**
(S)(3-0-3)
First of a two-course sequence emphasizing periodontal diseases, their classifications, and the etiological factors involved. Preventive
measures within the scope and responsibility of the dental hygienist are correlated with basic sciences and clinical aspects of periodontal diseases.

DHE 244 General and Oral Pathology
(W)(3-0-3)
Introduction to general pathology and common oral pathologies. Basic pathology, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

DHE 252 Oral Radiology I
(F)(2-3-3)
Theoretical background and practical application for dental radiography. Exposure techniques, processing, mounting and evaluation of dental radiographs; physical principles of production; clinical use of X-radiation and radiation safety procedures.

DHE 253 Oral Radiology II
(W)(2-0-2)
Techniques for patients with special needs, extra-oral procedures, occlusal projections, radiographic detection and interpretation of potential pathology. Introduction to panoramic exposure techniques and images and refinement of techniques in exposure, processing and radiographic evaluation. Prerequisite: DHE 252.

DHE 261 Dental Health Education
(S)(3-0-3)
An application of the concepts of preventive dentistry. Course includes oral health instruction for the individual patient based on an understanding of the causes and means to control dental disease. Selection and evaluation of oral hygiene aids, patient education, and other materials will be investigated. Concept of effective patient communication and motivation will be emphasized.

DHE 275 Dental Ethics
(W)(2-0-2)
Professional ethics and legal requirements of the dental profession.

DHE 282 Medical and Dental Emergency Procedures
(W)(2-3-3)
Equipment, drugs, signs, symptoms and treatment of medical emergencies that may occur in dental offices. Individual and team practice in carrying out emergency procedures (pulse, respiration, blood pressure, IV setup, oxygen, cardiopulmonary resuscitation, etc.) in timed simulations.

DHE 299 Laboratory Practice
(Hours to be arranged each term.)

DHE 311 Principles of Dental Hygiene IV
(Su)(3-0-3)
Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Students will learn how to promote patient adherence to disease prevention and health maintenance using evidence-based strategies. Prerequisite: DHE 213.

DHE 312 Principles of Dental Hygiene V
(F)(3-0-3)
Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to clinical cases. Care of special needs populations emphasized. Prerequisite: DHE 311.

DHE 313 Principles of Dental Hygiene VI
(W)(4-0-4)
Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to clinical cases. Interviewing skills, career opportunities and alternative practice settings discussed. Community health programs evaluated. Prerequisite: DHE 312.

DHE 320 Dental Materials
(S)(2-6-4)
General properties, composition and manipulation of common dental and restorative materials. Expanded functions including denture relines and amalgam polishing are practiced. Prerequisite: DHE 282.

DHE 321 Dental Hygiene Clinical Practice IV
(Su)(0-12-4)
Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced. Prerequisite: DHE 322.

DHE 322 Dental Hygiene Clinical Practice V
(F)(0-12-4)
Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced. Prerequisite: DHE 322.

DHE 333 Periodontal Therapy
(Su)(3-0-3)
Philosophy and theoretical background of advanced periodontal issues of all supportive structures are explored. Various periodontal surgery techniques are studied. Prerequisite: DHE 233.

DHE 344 Advanced General and Oral Pathology
(3-0-3)
Further study of general and oral pathology. Developmental, hereditary, and congenital disorders. Endocrine, cardiovascular, hematopoietic, respiratory, gastrointestinal, neurologic, and skeletal disorders. Tooth abnormalities, radiographic lesions, and oral tissue enlargements. Systemic and oral complications of HIV and AIDS. Lesion description emphasized. Prerequisite: DHE 244.

DHE 351 Dental Analgesia
(Su)(2-3-3)
This course explores pain control methods, including local anesthesia and nitrous oxide/oxygen analgesia. Health information evaluation, local and systemic complications, anesthetic solutions, and vasoconstrictors and drug interactions are discussed. Techniques of local anesthesia, including block and infiltration injections are practiced. Administration of nitrous oxide is also practiced. Prerequisites: DHE 223, DHE 282.

DHE 366 Dental Anatomy
(F)(2-0-2)
In-depth study of crown and root morphology of primary and permanent dentitions.

Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science
with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

DHE 380 Oral Health Planning and Care I
(Su)(2-3-3)
Major concepts of public health including epidemiology, prevention and financing are covered. A systematic approach to planning group oral health projects begins.

DHE 381 Oral Health Planning and Care II
(F)(2-6-4)
Biostatistics and careers in public health are explored. Community oral health projects are implemented and evaluated. Table clinics and portfolios that document components of projects are presented. Prerequisite: DHE 380.

DHE 399 Laboratory Practice
(Hours to be arranged each term.)

DHE 461 Restorative Dentistry I
(Su)(1-3-2)
Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restorations on typodonts. Prerequisite: DHE 366

DHE 462 Restorative Dentistry II
(F)(1-3-2)
Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restorations on typodonts and patients. Prerequisite: DHE 461

DHE 463 Restorative Dentistry III
(W)(0-12-4)
Emphasis on restoration placement techniques. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restorations on patients. Prerequisite: DHE 462

(DMS) Diagnostic Medical Sonography

DMS 107, DMS 207, DMS 307, DMS 407 Seminar
(Hours to be arranged each term.)

DMS 223 Applications of Abdominal Sonography I
(F)(3-0-3)
History of sonography. Orientation to patient history, abdominal cross-sectional anatomy, scanning and normal sonographic presentation. Prerequisite: DMS 223 with grade “C” or better.

DMS 224 Applications of Abdominal Sonography II
(W)(3-0-3)
Orientation to cross-sectional abdominal anatomy and pathology of organs and vessels. Procedures and techniques, including scanning. Prerequisite: DMS 223 with grade “C” or better.

DMS 225 Applications of Abdominal Sonography III
(S)(3-0-3)
Advanced abdominal scanning procedures and techniques. Emphasis on superficial structures invasive procedures and Doppler correlation, including scanning. Prerequisites: DMS 224 and DMS 253 with grade “C” or better.

DMS 234 Pelvic Sonography
(S)(3-0-3)
Orientation to male and female pelvic cross-sectional anatomy and pathology, differentiating between normal variations and abnormalities to include first trimester obstetrics and trans-vaginal scanning. Prerequisites: DMS 224 and DMS 253 with grade “C” or better.

DMS 235 Diagnostic Medical Sonography Patient Care
(W)(3-0-3)
Sonographic management and applications of cognitive, psychomotor, and interpersonal skills as they relate to the health care consumer. Patient assessment and communication, body mechanics, medical and surgical asepsis, medical emergencies, pharmacology and analysis of ethical and legal issues. Prerequisite: DMS 223 with grade “C” or better.

DMS 252 Sophomore Laboratory I
(F)(0-3-1)

DMS 253 Sophomore Laboratory II
(W)(0-3-1)
Applied scanning of the remainder of the abdominal cavity stressing anatomy, standard imaging planes, Doppler correlation and hard copy quality. Imaging review of prior anatomical areas. Prerequisites: BIO 335, DMS 223, DMS 252 with grade “C” or better. Corequisites: DMS 224, MIT 231.

DMS 254 Sophomore Laboratory III
(S)(0-3-1)
DMS orientation to cross-sectional pelvic anatomy and pathology of the male and female pelvis. Procedures and techniques, including scanning. Prerequisites: DMS 224 and DMS 253 both with grade “C” or better. Corequisite: DMS 225.

DMS 316 Survey of Vascular Technology
(W)(3-0-3)
Orientation to vascular physics, equipment, and colorflow imaging. Explanation of Doppler imaging in relation to vascular anatomy. Prerequisite: DMS 234, DMS 235, and DMS 352 with grade “C” or better.

DMS 337 Breast Sonography
(F)(3-0-3)
Breast sonographic scanning procedures with an emphasis on sonographic applications. Correlation with other imaging modalities. Prerequisite: DMS 225 with grade “C” or better.

DMS 342 Survey of Adult Echocardiography
(W)(3-0-3)
Survey of adult echocardiographic imaging applications with emphasis on parasternal, apical, subcostal and suprasternal 2-D views. Standard M-Mode measurements, Doppler and color Doppler. Common cardiac pathologies. Prerequisite: DMS 352 with grade “C” or better.
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

DMS 343 Fetal Echo, Neonatal, and Pediatric Sonography
(S)(3-0-3)
Fetal cardiac development and normal anatomy. Fetal echocardiographic 2D views, M-Mode, Doppler and Color Doppler. Common fetal cardiac pathology and anomalies. Neonatal topics include hip, abdominal and neurological sonographic applications. General sonographic pediatric pathologies and anomalies will be discussed.
Prerequisites: DMS 342 and DMS 372 both with grade “C” or better.

DMS 346 Musculoskeletal Sonography
(F)(3-0-3)
Survey of sonographic musculoskeletal imaging with emphasis on normal and abnormal findings.
Prerequisite: DMS 225 with grade “C” or better.

DMS 352 Junior Laboratory I
(F)(0-3-1)
Topics to include the male/female pelvis, first trimester, musculoskeletal, and breast stressing sonographic anatomy, standard imaging planes, and image quality.
Prerequisite: DMS 254 with grade “C” or better.

DMS 353 Junior Laboratory II
(W)(0-3-1)
Topics to include normal first, second, third trimester, and cardiovascular stressing anatomy, standard imaging planes, and image quality.
Prerequisite: DMS 352 with grade “C” or better.

DMS 354 Junior Laboratory III
(S)(0-3-1)
Applied sonographic laboratory procedures and techniques. Emphasis on protocols and case reviews.
Prerequisite: DMS 353 with grade “C” or better.

DMS 365 Sonographic Pathology
(F)(3-0-3)
Differential diagnosis and concepts of disease processes as applied to sonographic examination.
Prerequisite: Junior standing in DMS.

DMS 370 Obstetrical Sonography
(W)(3-0-3)
Orientation to obstetrical scanning procedures and techniques. Emphasis on normal obstetrical anatomy and fetal development.
Prerequisites: DMS 224, DMS 225 and DMS 234 with grade “C” or better.

DMS 373 Obstetrical Pathology
(S)(3-0-3)
Advanced obstetrical scanning of second and third trimester obstetrical patients with emphasis on pathology.
Prerequisite: DMS 372 with grade “C” or better.

DMS 388 Externship Preparation
(W)(2-0-2)
Presentation of key concepts related to Diagnostic Medical Sonography externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the DMS Externship Handbook.
Prerequisites: DMS 316, DMS 353 and DMS 371 with grade “C” or better.
Corequisites: DMS 365, DMS 373.

DMS 430 Diagnostic Medical Sonography Externship
(F,W,S)(0-40-15)
All B.S. students must complete four terms (12 months) of clinical experience in sonography at an Oregon Tech approved clinical site. Students will work under the direct supervision of registered sonographers.
Prerequisites: All academic coursework in the Diagnostic Medical Sonography curriculum.

DMS 430A, DMS 430B Diagnostic Medical Sonography Externship
(430A-F,S, 0-22-8)(430B-W,S, 0-18-7)
This two-term special externship is designed for the degree completion student. Students working in a clinical ultrasound setting will prepare clinical case studies.
Prerequisites: Be an ARDMS Sonographer in good standing and have completed all academic coursework in the Medical Imaging curriculum with grade “C” or better.

ECHO 225 Cardiopulmonary Patient Management Practices
(S)(2-3-3)
Current issues in the practice of echocardiography with emphasis on the technologist's responsibilities to the patient, the patient’s family and the professions of echocardiography. Transporting critically ill patients and recognizing emergency situations.
Prerequisite: ECHO 231.

ECHO 227 Basic ECG Recognition and Testing
(F,S)(3-0-3)
Basics of ECG testing, heart pressures, blood volume/physiology and the electrical conduction system. Focus on interpretation of ECG rhymes: normal ECG, ventricular hypertrophy, bundle branch block, AV block, myocardial ischemia, bradycardia, tachycardia, atrial fibrillation, ventricular fibrillation and irregular rhythms.

ECHO 231 Echocardiography I
(W)(3-3-4)
An introduction to scanning techniques and tomographic views according to the American Society of Echocardiography standards. B-mode image, pulsed and continuous wave Doppler, and color-flow imaging.
Prerequisite: ECHO 320.

ECHO 232 Echocardiography II
(S)(3-3-4)
An intermediate level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Emphasis on cardiac pathology and the echocardiography evaluation.
Prerequisite: ECHO 231.

ECHO 320 Cardiographic Methods
(F)(3-0-3)
Recognition of ECG tracing with normal and abnormal arrhythmias, treadmill testing, holter monitoring, phonocardiography, and heart auscultation. Review of case examples for analysis and synthesis. Integration of cardiographic monitoring methods with cardiac ultrasound imaging. Review of cardiac anatomy.
Prerequisite: ECHO 232

ECHO 321 Stress and Transeosophageal Echo
(F)(3-0-3)
Cardiac applications, protocols, and techniques related to stress echo and trans-
esophageal echo. TEE anatomy, acquisition of images and the cardiovascular operating room. Particular emphasis on the mitral valve and surgical repairs. Prerequisite: Admission into MIT Echocardiography Program

ECHO 325 Pediatric Echocardiography
(F,W,S)(3-0-3)
Congenital heart disease, including neonate/infant and adult disorders. Congenital disorders including cardiac situs, ventricular morphology, great artery connections, valvular and subvalvular obstruction, atrial septal defect, ventricular septal defect. Prerequisite: ECHO 333.

ECHO 332 Invasive Cardiology
(E,S)(3-0-3)
Cardiac catheterization testing. Coronary artery interventions such as percutaneous coronary intervention (PCI) and chamber pressure measurements. Prerequisite: ECHO 231.

ECHO 333 Echocardiography III
(F)(3-3-4)
An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Cardiac pathology, and advanced methods in echocardiography. Prerequisite: ECHO 232.

ECHO 334 Echocardiography IV
(F,W,S)(3-3-4)
An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Special topics including 3-D, 4-D, tissue Doppler, cardiac resynchronization and other technological advances. Prerequisite: ECHO 333.

ECHO 365 Abdominal/Renal Testing
(F,W,S)(3-3-4)
Abdominal vascular anatomy and common disease processes. Students will be asked to perform basic abdominal vascular tests following very specific protocols and interpretations. Prerequisites: ECHO 325, ECHO 376. Corequisites: ECHO 385, ECHO 388.

ECHO 376 Survey of Vascular Testing
(W,S)(2-3-3)
Basic vascular pathophysiology in carotid, arterial, and venous testing. Waveform recognition, interpretation, and protocols for testing. Prerequisite: ECHO 333.

ECHO 385 Echocardiography Laboratory Management
(F,W,S)(3-0-3)
Focus on human resource skills as necessary to manage an echocardiography laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

ECHO 388 Externship Preparation
(S)(3-0-3)
Review and summarization of key concepts in Echocardiography. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent echo lab. Review and discussion of the Echocardiography Externship Handbook. Corequisite: ECHO 334.

ECHO 420 Echocardiography Externship
(F,W,S)(0-40-15)
Students work as registered professionals in the field and must complete nine months (three terms) of experience in Echocardiography. Prerequisite: Admission to Echocardiography Degree Completion Program.

ECHO 420A Echocardiography Externship
(F,W,S)(0-22-8)
Students work as registered professionals in the field. Patient echo exams with normal and abnormal stress tests, normal and abnormal wall motion. Case study presentation. Prerequisite: Admission to Echocardiography Degree Completion Program.

ECHO 420B Echocardiography Externship
(F,W,S)(0-18-7)
Students work as registered professionals in the field. Cardiac surgical echoes (TEE) and contrast studies using various pharmacological agents. Case study presentation. Prerequisite: Admission to Echocardiography Degree Completion Program.

ECHO 421 Echo Senior Project
(F,W,S)(4-0-4)
Students design a research-based senior project in the field of echocardiography, including interviews, research, literature review and formal presentation of the project. Prerequisites: ECHO 420; WRI 123 or WRI 227.

(ECO) Economics
ECO 107, ECO 207, ECO 307, ECO 407 Seminar
(Hours to be arranged each term.) SS

ECO 201 Principles of Economics, Microeconomics
(F,W,S)(3-0-3) SS
Topics include scarcity, consumer choice, supply and demand, elasticity, cost and pricing theory, theory of market structures (competition, monopoly, monopolistic competition, oligopoly). Prerequisite: College level math.

ECO 202 Principles of Economics, Macroeconomics
(F,W,S)(3-0-3) SS
An introduction to the economic problem. Topics include gross domestic product, unemployment, monetary policy, fiscal policy, macro equilibrium, inflation, and supply and demand. Prerequisite: College level math.

ECO 203 Principles of Economics, Special Topics
(W,S)(3-0-3) SS
A survey of micro- and macroeconomic topics of current interest. Topics may include labor practices, international economics, natural resource economics, urban planning, and economic policy issues. Students prepare a research paper and present results to the class. Prerequisites: ECO 201, ECO 202.

ECO 357 Energy Economics and Policy
(W)(3-0-3) SS
Explores the role of energy and energy resources from the economic perspective. Analyzes U.S. and global energy markets and policy; traditional and alternative energy sources; pricing of externalities and public goods; the use of market instruments, subsidies and taxes; and the political economy. Prerequisites: ECO 201 or ECO 202, and MATH 243 or MATH 361.
ECO 367 International Economics and Finance Management
(W)(4-0-4) SS
Financial management involving international monetary environment; foreign exchange risk management; source and availability of funds to finance trade and multinational operations; taxation planning and control; international portfolio diversification; international banking; capital budgeting; political risk evaluation of performance.
Prerequisites: BUS 308 and ECO 201 or ECO 202.

(EE) Electrical Engineering
EE 101, EE 102, EE 103
Introduction to Engineering I, II, III
101-F(0-3-1) 102-W(0-3-1) 103-S(0-3-1)
A three course sequence introducing the field of engineering, focusing on electrical engineering and renewable energy. Success strategies, Engineering and scientific notation. Ohm’s Law. Problem solving, communication skills, ethics in engineering. Professional development and lifelong learning. Introduction to the design process culminating in a team design experience.

EE 107, EE 207, EE 307, EE 407 Seminar
(Hours to be arranged each term.)

EE 121 Fundamentals of Electric Circuits I
(3-3-4)
DC Analysis and First-Order transients. Ohm’s Law, Kirchhoff’s laws, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, maximum power transfer, superposition, introduction to op-amps, inductance and capacitance, transient response of RC and RL circuits.
Prerequisite: MATH 111

EE 122 Fundamentals of Electric Circuits II
(3-3-4)
AC analysis, second-order transients, introduction to electric power. Transient response of second-order circuits, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, sinusoidal steady-state power calculations, balanced three-phase circuits, mutual inductance, transformers.
Prerequisite: EE 121, MATH 112

EE 131 Digital Electronics I
(F,W,S)(3-3-4)
Introduction to combinational logic, gates, Boolean Algebra, Karnaugh Mapping, Number Systems/Codes, arithmetic circuits, decoders/encoders, mux/demux, comparators, basic sequential gates (Latches/FF) introduction to HDL (Verilog/VHDL), PLD HW implementation.
Pre- or corequisite: MATH 111.

EE 133 Digital Electronics II
(F,W)(3-3-4)
Introduction to sequential logic, with HDL, Review latches and flip/flops, timers, counters/registers, HDL implementation, PLD HW Implementation, finite state machine design/analysis, logic testing and timing analysis.
Prerequisites: EE 132 or EE 131 with grade “C” or better, MATH 111.

EE 219 Introduction to Semiconductor Devices and Amplifiers
(3-3-4)
Introduction to semiconductor devices, characteristics of biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as amplifiers and switches.
Prerequisite: EE 123

EE 221 Circuits I
(F,W)(3-3-4)
Corequisite: MATH 251.

EE 222 Circuits II
(W,S)(3-3-4)
Corequisite: MATH 252.

EE 225 Circuits III
(ES)(3-3-4)
Prerequisite: EE 223 with grade “C” or better.
Corequisite: MATH 321.

EE 236 LabVIEW Programming
(3-3-4)
An object oriented programming course using National Instruments LabVIEW programming language designed for programming data-logging, instrumentation and control applications. Basic flow-charting is introduced. Logical constructs as implemented by LabVIEW are investigated. Example control problems are investigated and programmed using LabVIEW.
Prerequisite: MATH 112.

EE 311 Signals and Systems
(S)(3-3-4)
Prerequisite: EE 225 with grade “C” or better.

EE 320 Advanced Circuit and Systems Analysis
(ES)(4-3-5)
Prerequisites: EE 223 or EE 123, MATH 252.

EE 321 Electronics I
(F,W)(4-3-5)
Basic semiconductor theory. Diodes and diode circuits. Bipolar-junction transistor
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

<table>
<thead>
<tr>
<th>General Education Requirement</th>
<th>Courses</th>
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<tbody>
<tr>
<td>C - Communication</td>
<td>EE 311, EE 335</td>
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<td>EE 311, EE 335</td>
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</tbody>
</table>

For more information, see page 31

EE 431 Digital Signal Processing (F)(3-3-4)
Discrete systems and signals, linear time invariant systems, difference equations, frequency response, Z-transforms, analysis software, discrete Fourier transforms.
Prerequisites: EE 311, EE 335, both with grade “C” or better.

EE 432 Advanced Digital System Design with HDL (S)(3-3-4)
Advanced digital signal design with hardware description languages such as VHDL and Verilog. Practical application of principles of digital design to system design using FPGAs. Completion of a FPGA-based system design project.
Prerequisite: EE 331.

EE 433 Biomedical I – Introduction to Biomedical Engineering (3-3-4)
Introduction to biomedical engineering, anatomy and physiology for engineers, biologicphenomena, biomedical sensors, biomedical instrumentation, biosignal processing, cardiovascular mechanics, biomaterials, tissue engineering, biomedical imaging and clinical engineering.
Prerequisite: EE 311 with grade “C” or better.

EE 434 Biomedical II – Signal Processing (3-3-4)
Fundamental problems of biomedical signal processing; signal analysis; signal modeling, sources and types of biomedical signals. Arterial and ambulatory blood pressure (ABP/ABPM); intracranial pressures (ICP); pulse oximetry (SpO2); electrocardiogram (ECG). Stochastic, harmonic models, spectrum analysis and time-frequency analysis.
Prerequisite: EE 311 with grade “C” or better.

EE 435 Biomedical III – Instrumentation (3-3-4)
Review of biological systems (human), signals, measurements and transducers; biologic signals and amplifiers; electrocardiograph (ECG); blood pressure; ultrasound; x-ray; radiology and nuclear medicine equipment; power sources; electro-magnetic interference (EMI) effects; and electrical safety.
Prerequisite: EE 311 with grade “C” or better.

EE 441 Biomedical I – Introduction to Biomedical Engineering (3-3-4)
Introduction to biomedical engineering, anatomy and physiology for engineers, biologicphenomena, biomedical sensors, biomedical instrumentation, biosignal processing, cardiovascular mechanics, biomaterials, tissue engineering, biomedical imaging and clinical engineering.
Prerequisite: EE 311 with grade “C” or better.

EE 443 Biomedical II – Signal Processing (3-3-4)
Fundamental problems of biomedical signal processing; signal analysis; signal modeling, sources and types of biomedical signals. Arterial and ambulatory blood pressure (ABP/ABPM); intracranial pressures (ICP); pulse oximetry (SpO2); electrocardiogram (ECG). Stochastic, harmonic models, spectrum analysis and time-frequency analysis.
Prerequisite: EE 311 with grade “C” or better.

EE 444 Biomedical III – Instrumentation (3-3-4)
Review of biological systems (human), signals, measurements and transducers; biologic signals and amplifiers; electrocardiograph (ECG); blood pressure; ultrasound; x-ray; radiology and nuclear medicine equipment; power sources; electro-magnetic interference (EMI) effects; and electrical safety.
Prerequisite: EE 311 with grade “C” or better.

EE 448 Geometric Optics (W)(3-3-4)
Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.
Prerequisite: PHY 223

EE 449 Radiometry & Optical Detection (F)(3-3-4)
Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectro-radiometry.
Prerequisite: PHY 223, EE 223

EE 450 Physical Optics (S)(3-3-4)
Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.
Prerequisite: PHY 223

EE 451 Lasers (F)(3-3-4)
Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.
Prerequisites: EE 450 or PHY 450

EE 452 Waveguides and Fiber Optics (W)(3-3-4)
Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.
Prerequisites: EE 450 or PHY 450

EE 453 Optical Metrology (S)(3-3-4)
Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.
Prerequisites: EE 450 or PHY 450

EE 454 Computer Vision (W)(3-3-4)
Digital image processing; analysis and time-frequency analysis.
Prerequisite: EE 311 with grade “C” or better.

EE 455 Machine Learning I (W)(4-0-4)
Theory and practice of Genetic Algorithms, Evolution Strategies, Backprop, Kernel Methods, Naive Bayes, Bayesian Belief Nets, Fuzzy Inference, brief discussion of Genetic Programming, Swarm Intelligence, Reinforcement Learning, Bayes Optimal
Prerequisite: EE 430; or MATH 327 and CIST116

EE 473 Machine Learning II (S)(3-3-4)
Integration of Information Theory and Statistical Learning into a generalized framework including Support-Vector Machines, Adaptive Resonance, and Adaptive Critics, plus project.
Prerequisite: EE 471

EE 478 Geometric Optics (F)(3-3-4)
Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.
Prerequisite: PHY 223

EE 479 Radiometry & Optical Detection (W)(3-3-4)
Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectro-radiometry.
Prerequisite: PHY 223

EE 480 Machine Learning II (W)(4-0-4)
Theory and practice of Genetic Algorithms, Evolution Strategies, Backprop, Kernel Methods, Naive Bayes, Bayesian Belief Nets, Fuzzy Inference, brief discussion of Genetic Programming, Swarm Intelligence, Reinforcement Learning, Bayes Optimal
Prerequisite: EE 430; or MATH 327 and CIST116
Introduction to semiconductor devices, characteristics and biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as diodes and switches. Prerequisite: EET 218.

EET 237 AC Circuits, Filters and Signals
(S)(3-0-3)
RC transient analysis, sinusoidal AC voltage, phasors, average and effective value, the decibel, simple RC transfer functions, low-pass, high-pass and band-pass filters, periodic and aperiodic signals in time and frequency, bandwidth. For non-EET majors.
Prerequisites: EE 221 or EET 115 with grade “C” or better; MATH 252.
Corequisite: EET 238.

EET 238 AC Circuits, Filters and Signals Laboratory
(S)(0-3-1)
Lab to accompany EET 237. For non-EET majors.
Prerequisites: EE 221 or EET 115 with grade “C” or better, MATH 252.
Corequisite: EET 237.

EET 308 Introduction to MOS Microelectronics
(W)(3-0-3)
Introduction to microelectronics, semiconductor physics, integrated circuit (IC) technology, pn junction and MOS (Metal-Oxide-Semiconductor) electrostatics, MOS FETs (Field-Effect Transistors), selected digital circuits using CMOS (Complementary MOS) FETs, PSPICE modeling of IC MOSFETs.
Prerequisites: EET 245 or EET 237 and CST 262 or instructor consent.
Corequisite: EET 309.

EET 309 Introduction to MOS Microelectronics Laboratory
(W)(0-3-1)
Laboratory companion to EET 308. Theoretical concepts discussed in lecture verified using available components and instrumentation. Computer simulation using PSPICE. Written and oral laboratory reports required.
Prerequisites: EET 246 or EET 238 and CST 262 or instructor consent.
Corequisite: EET 308.

(F)(3-9-6)
The first of two courses required for an entry-level career in emergency medical services. The course introduces students to the EMS system, professional attributes of an EMT, ambulance operations and the basic knowledge and skills of an EMT.
Prerequisites: Current CPR certification.

EMS 152 Emergency Medical Technician (EMT) II
(W)(3-9-6)
The second of two course focuses on the basic recognition and treatment of specific illnesses and injuries. The course includes 16-hours of clinical and ambulance experience. Students successfully completing the course are eligible for Oregon and national certification examinations.
Prerequisite: EMS 151.

EMS 190 Emergency Medical Technician Externship
(0-12-4)
EMS field experience with an affiliated transport agency. Students work at a BLS level under the direct supervision of one of the local EMS agency ambulances.
Prerequisites: EMS 152 or Oregon EMT certification.
EMS 200 Medical Terminology
(F)(3-0-3)
Students build a strong medical vocabulary using prefixes, suffixes, and Greek and Latin verbs and adjectives. Students learn anatomical roots and examine anatomical structures, disease, procedures, tumors, and descriptive terms using simple word analysis.

EMS 211 Prehospital Emergency Pharmacology
(W)(3-0-3)
Lectures relating specific emergencies to the types of medications used for treatment. Includes classifications, actions, indications, administration and dosages, precautions and side effects of each of the medications used in prehospital treatment of medical and traumatic emergencies. In addition, students learn common prescription medications found in the home. Prerequisite: CHE 210.

EMS 218 Trauma Emergencies
(F)(3-0-3)
Introduces the epidemiology and kinematics of trauma, and integrates the assessment findings with pathophysiology in the management of the acutely injured patient. Discusses considerations for special patient populations and includes a Prehospital Trauma Life Support certification course.

EMS 231 Medical Emergencies I
(F)(4-0-4)
The first in a series of three courses address- ing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.

EMS 232 Medical Emergencies II
(W)(3-0-3)
A continuation of the series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness. Prerequisite: EMS 231.

EMS 233 Medical Emergencies III
(S)(3-0-3)
The conclusion of the sequence in medical emergencies where the epidemiology, pathophysiology and assessment findings are integrated to form a treatments plan for acute illnesses in the emergency setting. Prerequisite: EMS 232.

EMS 235 Basic Electrocardiography
(F)(3-0-3)

EMS 236 Advanced Electrocardiography
(W)(3-0-3)
Building upon basic EKG knowledge, this course advances into 12-lead EKG interpretation and prehospital treatment. Focusing on signs and symptoms of ischemia or infarction, axis deviation, and other EKG anomalies, students learn about various treatment modalities.

EMS 241 Paramedic Crisis Resource Management I
(F)(2-3-3)
The first in a series of 3 courses addressing human factors contribution to EMS scene management. PCRM I focuses on human error, perception modalities, human emotion and motivation, and teamwork theory.

EMS 242 Paramedic Crises Resource Management II
(W)(1-0-1)
The second class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRM 2 focuses on the following human factor contributions to scene performance; review of acute healthcare environment challenges, cognitive attention, and crisis communication strategies. Prerequisite: EMS 241.

EMS 243 Paramedic Crises Resource Management III
(S)(1-0-1)
The third class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRM III focuses on the following human factor contributions to scene performance; stress and coping on decision-making, on-scene leadership characteristics, and organizational influences on error. Prerequisite: EMS 242.

EMS 271 Paramedic Skills Laboratory I
(F)(2-3-3)
EMS 292 Paramedic Field Externship Practicum II
(Su)(0-36-12)
The continuation of the field experience courses with an affiliated advanced life support agency. Students work in the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.
Prerequisite: EMS 291

EMS 321 Community Paramedic I
(W)(4-0-4)
First course in a two course series addressing the management of chronic illness, social service connection, and healthcare system navigation as it relates to the prehospital environment.
Prerequisite: Current National or State Paramedic Certification.

EMS 322 Community Paramedic II
Second course in a two course series addressing the management of chronic illness, social service connection, and healthcare system navigation as it relates to the prehospital environment.
Prerequisite: Current National or State Paramedic Certification.

EMS 331 Critical Care Transport I
(W)(4-0-4)
The first of 2 courses is designed to prepare paramedics to provide advanced critical care during transports, including performing advanced clinical patient assessments and providing invasive care beyond the standard scope of advanced pre-hospital care.
Prerequisite: Paramedic Credentials or instructor permission.

EMS 332 Critical Care Transport II
(S)(4-0-4)
The second of 2 courses is designed to prepare paramedics to provide advanced critical care during transports, including performing advanced clinical patient assessments and providing invasive care beyond the standard scope of advanced pre-hospital care.
Prerequisites: EMS 331, EMS 381.

EMS 341 Community Paramedic Clinical I
(F)(0-6-2)
The first course in a series of two courses addressing the management of chronic illness, social service connection, and health care system navigation as it relates to the prehospital environment. This course focuses on the management of chronic/sub-acute illness.
Prerequisite: Current National or State Paramedic Certification.
Co-requisite: EMS 321

EMS 342
(W)(0-6-2)
The second course in a series of two courses addressing the management of chronic illness, social service connection, and health care system navigation as it relates to the pre-hospital environment. This course focuses on the management of chronic/sub-acute illness.
Prerequisite: EMS 322

EMS 381 Critical Care Clinical Practicum I
(W)(0-3-1)
The first of two practicum classes that exposes students to critical care transport topics focusing on psychomotor skills and the science behind them. This practicum is designed to prepare the student for EMS 382 ICU and critical care transport experience.
Co-requisite: EMS 331

EMS 382 Clinical Care Clinical Practicum II
(S)(0-9-3)
The second of two practicum classes that exposes students to critical care transport environments that may include experiences with intensive care units, fixed wing transport, rotor wing transport, critical care ground transport, as well as various specialty critical care teams.
Prerequisite: EMS 331
Co-requisite: EMS 332

EMS 444 EMS Systems Leadership and Management
(F)(3-0-3)
Explores the fundamental skills of managing and leading in EMS: concepts, principles and practices of leaders in the EMS industry. Case study discussions and analysis. Examines EMS systems, operations, resources and regulation of EMS. Industry leaders provide guest lectures.
Prerequisites: PSY 347, BUS 317

EMS 456 Research Methods in EMS
(S)(2-0-2)
An introductory course in EMS research covering hypothesis formulation, design and use of data-gathering instruments, data collection, and methods of data analysis and presentation. Research and technical reports appearing in professional publications and archives are examined.
Prerequisite: MATH 361

EMS 496 Capstone Project I
(W)(1-6-3)
Students formulate a detailed plan for a project or independent research study within the EMS industry. Project plan will include topic outline and goals, timeline, industry contacts. Faculty advisor will be assigned.
Prerequisites: WRI 227, MATH 361

EMS 497 Capstone Project II
(S)(1-6-3)
Implementation and completion of student project planned in EMS 496. Project results to be delivered in a report presented to an audience of EMS peers. Students will have scheduled meetings with a faculty advisor to track progress and determine readiness for presentation.
Prerequisite: EMS 496

(ENGR) Engineering

ENGR 101 Introduction to Engineering I
(F)(1-3-2)
Introduces the student to engineering with a focus on academic success, professional development, ethics, communication, creative problem solving techniques, engineering tools (CAD/CAE), and design concepts. A discipline-specific team-based laboratory experience encourages consideration of a chosen engineering discipline.

ENGR 102 Introduction to Engineering II
(W)(1-3-2)
The student will focus on their chosen discipline through an interdisciplinary team-based design project including problem identification, measurement, analysis and presentation to peers. Emphasis will be placed on proper usage of engineering tools and instruments and sound design practices.
Prerequisite: ENGR 101.

ENGR 111 MMET Orientation
(F)(1-3-2)
Topics include: survey of the engineering profession, educational and professional development, standards of practice; engineering information, calculations, and analysis. An engineering design project will be incorporated. This course provides knowledge and skills to engineering students which will assist them in their chosen discipline.

Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

**C** - Communication  **H** - Humanities  **HP** - Humanities Performance  **SS** - Social Science

**ENGR 207 Seminar**
(Hours to be arranged each term.)

**ENGR 211 Engineering Mechanics: Statics**
(F,W,S)(4-0-4)
Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems.
Pre- or corequisite: MATH 252.
Prerequisite: PHY 201 or PHY 221.

**ENGR 212 Engineering Mechanics: Dynamics**
(W,S)(3-0-3)
Kinematics of particles and rigid bodies. Kinetics of particles and rigid bodies in plane motion, including Newton's second law, work and energy, and impulse and momentum.
Prerequisites: ENGR 211, MATH 252.

**ENGR 213 Engineering Mechanics: Strength of Materials**
(F,W,S)(3-3-4)
Internal stresses and deformations of structural members and machines when subjected to external forces.
Prerequisite: ENGR 211.

**ENGR 236 Fundamentals of Electric Circuits**
(F,S)(3-0-3)
Resistive circuits, operational amplifiers, capacitors, inductors, transient analysis, sine waves, AC circuit analysis, resonance, transformers. Not for Electronics Engineering Technology and Computer Engineering Technology students.
Prerequisites: MATH 251, PHY 202/222.

**ENGR 266 Engineering Computation**
(F,W,S)(2-3-3)
Programming and problem solving using current computer software. General programming techniques using conditional statements, looping, subroutines, and data input/output will be stressed. Consideration of features specific to the software being used will also be presented.
Prerequisite: MATH 111.

**ENGR 267 Engineering Programming**
(W,S)(2-3-3)
Prerequisite: MATH 251.

**ENGR 305 Nanoscience and Nanotechnology**
(F)(4-0-4)
Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.
Prerequisites: PHY222 or PHY223, and CHE202 or CHE222

**ENGR 318 Engineering Mechanics: Fluids**
(F)(3-3-4)
Fundamental properties of fluids, fluid statics and pressure variation, flow characterization, momentum and forces due to fluid motion, energy of fluids in motion, and flow in conduits. Emphasis on civil and mechanical engineering applications of fluid mechanics principles.
Prerequisites: ENGR 211 and MATH 252.

**ENGR 355 Thermodynamics**
(F,W)(3-0-3)
An introductory course in thermodynamics, the science of heat energy conversion. Develops understanding of energy, heat, work, efficiency, and ideal thermodynamic cycles. Teaches first and second laws of thermodynamics and perfect gas law.
Prerequisites: MATH 252; PHY 202 or PHY 222.

**ENGR 407 Seminar**
(Hours to be arranged each term.)

**ENGR 420 Engineering Modeling**
(F)(3-3-4)
Development of linear and nonlinear models of engineering systems. Modeling of mechanical, electrical, electromechanical, fluid, and thermal systems. System identification from data.
Prerequisites: ENGR 266 or 267, MATH 341, EE 225 or MECH 490, PHY 223

**ENGR 421 Automation Systems**
(F)(3-3-4)
Design of industrial automation systems. Industrial networking and data handling. Industrial controller and operator interface configuration and programming. Design of SCADA systems.
Prerequisites: EE 355 or MECH 436, REE 463 or MECH 363, ENGR 420

**ENGR 422 Process Control**
(W)(3-3-4)
Design of continuous and batch process control systems. Advanced control schemes, including model-based methods.
Prerequisite: ENGR 421

**ENGR 423 Motion Control and Robotics**
(S)(3-3-4)
Motion control components, including power supplies, controllers, instrumentation, and actuators. Robot kinematics and servo control. Design of motion control systems.
Prerequisites: ENGR 421, ENGR 212, REE 253 or MET 326

**ENGR 445 Engineering Project Management**
(S)(3-0-3)
Applications of the Critical Path Method to organization and control of engineering projects. Applications software will be used to create and evaluate project networks to develop management reports.
Prerequisites: Junior standing in Engineering or Engineering Technology.

**ENGR 465 Capstone Project**
(F,W,S)(0-6-2)
Students apply material learned in other courses, develop expertise on a specific topic, work closely with a faculty member to implement the project and improve professional communication skills by writing a project report. Course may be repeated for credit.
Prerequisites: Junior standing and instructor permission.

**ENGR 485 Fundamentals of Engineering Exam Preparation**
(S)(1-0-1)
A preparation course covering the requirements of, and providing a review for, the NCEES FE exam.
Prerequisite: Senior class-level standing in an MMET program.

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science
puter aided design tools. Implementation of ASIC devices in digital computing systems including: modeling (using VHDL), digital synthesis, place and routing functions, and layout. Design exercises accomplished using hardware description languages and simulation.

Prerequisite: VLSI or ASIC coursework or experience.

ENGT 522 ASIC Design II
(W)(3-3-4)
Techniques used to transform hardware description language-based designs to physical layout. Applications of synthesis tools for floor planning and layout of Application Specific Integrated Circuits. Comprehensive study of logic design, layout generated design, and advanced CMOS circuit techniques used when designing with standard cells.

Prerequisite: ENGT 521.

ENGT 523 Advanced ASIC Design
(S)(3-3-4)
Introduction to very large scale integration (VLSI) technology and design of CMOS integrated circuits including: the device fabrication process and design rules as they apply to device layout. Analysis, design, simulation and layout rules presented. Logic gates and function design, simulation and physical layout.

Prerequisite: ENGT 522.

ENGT 545 Advanced Microcomputers
(S)(3-3-4)
Microprocessor technology and its application to the design of practical digital computing systems. Design techniques used to develop and design newer generation microprocessor-based computing systems. Assembly language programming and interfacing of microprocessor-based systems.

Prerequisite: Microprocessor coursework or experience.

ENGT 546 Advanced Computer Architectures
(W)(3-3-4)
Advanced topics in computer architectures including design of computer hardware, organizational structures, and architectural properties of parallel, vector and multiprocessing systems. Computer organizational structures of memory and I/O subsystems, multiprocessor computer architectures, and data flow computers.

Prerequisite: Course work or experience in computer architecture and organization.

ENGT 565 Semiconductor Device Physics and Processes
(3-0-3)
Simple models and physical insight to solid state physics. Crystal structure and symmetry, crystal lattices, reciprocal lattices, equilibrium and nonequilibrium processes in semiconductors. Thermal properties, energy band, and semiconductor properties.

ENGT 581 Master’s Project I
(F,W)(1-9-4)
Students prepare the proposal for the Master’s project under the guidance of a project advisor. Project proposal guidelines and accepted format presented. Approval of the proposal by the student’s project committee constitutes completion of the course.

ENGT 582 Master’s Project II
(W,S)(1-9-4)
Students complete task specified by the project advisor. Preliminary results of the student’s project presented to the student’s project committee. Acceptance of these results constitutes completion of the course.

ENGT 583 Master’s Project III
(W,S)(1-9-4)
Students produce the final report demonstrating the completion of the project. Final results of the student’s Master’s project presented to the student’s project committee. Acceptance of the report by the student’s project committee constitutes completion of the course.

Prerequisite: ENGT 581.

(ENV) Environmental Sciences
ENV 107, ENV 207, ENV 307, ENV 407 Seminar
(Hours to be arranged each term.)
Prerequisite: ENV major or instructor consent.

ENV 112 Environmental Social Sciences
(W)(2-0-2)
An introduction to the integration of science, social systems, environmental policy, and sustainability focusing on types of data, sampling techniques, and statistical methods used by social scientists. Emphasis on active learning and case study approaches.

Prerequisites: BIO 111, BIO 112, ECO 201, MATH 111 or instructor consent.

ENV 214 Watershed Science & Technology
(F,S)(2-3-3)
Science and technology of watershed processes, monitoring, and assessment. Applications and case studies focused on sustainable management and restoration of water resources and their associated aquatic, riparian, and upland ecosystems. Local and regional sites of interest are highlighted.

Prerequisite(s): BIO 111 or GEOG 105, or instructor consent

ENV 224 Scientific Reasoning and Methodology
(W)(3-0-3)
Fundamental principles and practices of scientific reasoning and methodology, including contrasts with other ways of making knowledge, the power of questions, theories versus hypotheses, understanding experiments, supporting claims, drawing inferences, reproducibility, and coping with uncertainty in typical uncontrolled natural experiments.

Prerequisite(s): BIO 111 or GEOG 105, or instructor consent

ENV 226 Environmental Data Analysis
(S)(2-3-3)
Introduction to compilation, manipulation, and analysis of datasets common to environmental analysis. Includes measures of central tendency and spread; characterizing data distribution; linear regression; exceedance probability and cumulative frequency functions; understanding time series; and basic principles of graphical data displays.

Prerequisites: BIO 111 or GEOG 105, or instructor consent

ENV 261 Sophomore Project Proposal
(W)(2-0-2)
Application of scientific reasoning and methodology, including literature survey and review; identification of topics, questions, and hypotheses; and experimental design and methodology. Requires preparation and presentation of a research proposal.

Prerequisite: BIO 213 or instructor consent
Courses with the following notation fulfill the appropriate general education requirements:

**ENV 262 Sophomore Project**
(S)(1-6-3)
Completion of field, laboratory, or investigative project with agencies, faculty members, or industry. Includes data collection, analysis and presentation of a scientific paper. Prerequisite: BIO 261 or instructor consent.

**ENV 265 Field Methods in Environmental Sciences**
(F)(1-6-3)
Basic principles of experimental design, site and instrument selection for field research. Basic instrumentation and data acquisition techniques are used to contribute to authentic research programs at different locations alongside environmental science professionals.

**ENV 314 Environmental Management and Restoration**
(W)(3-0-3)
Overview of legislative, regulatory, and public and private voluntary activities involving the management and restoration of natural ecosystems and their services. Emphasis on the National Environmental Policy, Clean Water, and Endangered Species Acts, with illustrative case studies from local and regional environments. Prerequisite: WRI 122.

**ENV 318 Systems Modeling**
(2-3-3)

**ENV 325 Environmental Microbiology**
(W)(2-6-4)
Microbial processes with emphasis on soil and water habitats. The impact of microorganisms in health, water and food sanitation, waste disposal, and bioremediation. Microscopy, laboratory, and field techniques for the isolation and identification of microorganisms. Prerequisites: BIO 213, CHE 223.

**ENV 336 Environmental Hydrology**
(S)(3-3-4)
Study of the hydrologic cycle; quantitative measurement of precipitation, infiltration, runoff, streamflow and storage in watersheds. Curve fitting, hydrographic analysis, statistical analysis of extreme flows, flood routing and runoff modeling for small and urban watersheds. Prerequisites: ENV 225, MATH 252, MATH 361.

**ENV 365 Advanced Field Methods in Environmental Sciences**
(F)(1-6-3)
Advanced principles of experimental design, site and instrument selection for field research. Advanced instrumentation and data acquisition techniques are used as part of authentic research programs at different locations alongside environmental science professionals. Course may be repeated for credit. Prerequisites: MATH 112 and WRI 122.

**ENV 367 Field Methods in Environmental Sciences**
(F)(1-6-3)
Analysis and presentation of project data, including statistical, graphical, geospatial, and/or other scientific methods. Review, presentation, and manuscript development are required. Prerequisite: ENV 262 or instructor consent.

**ENV 369 Treatment Wetlands**
(W)(3-0-3)
Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and stormwater treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies. Prerequisites: CHE 202, MATH 251.

**ENV 427 Greenhouse Gas Accounting/Footprints**
(S)(3-0-3)
Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as REE 427 (cannot be used for graduation credit by students who have taken REE 427). Prerequisites: Junior or senior standing, MATH 361 and WRI 227.

**ENV 435 Atmospheric Physics**
(F)(3-3-4)
The physics of transport and diffusion of air pollution. Atmospheric thermodynamics. Mixing heights, plume rise, and fundamentals of atmospheric turbulence. Eulerian and Lagrangian dispersion models. Prerequisites: MATH 252, PHY 202 or PHY 222.

**ENV 456 Integrated Watershed Analysis**
(3-3-4)

**ENV 457 Environmental Hydrology**
(W)(3-0-3)
Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and stormwater treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies. Prerequisites: CHE 202, MATH 251.

**ENV 472 Senior Project Proposal**
(W)(2-0-2)
Application of scientific reasoning and methodology, including literature survey and review; identification of topics, questions, and hypotheses; and experimental design and methodology. Requires preparation and presentation of a research proposal. Prerequisite: ENV 262 or instructor consent.

**ENV 473 Senior Project Data Collection**
(S)(1-6-3)
Application of scientific reasoning and methodology, including collection and development of field, laboratory, and/or geospatial data in collaboration with faculty and industry professionals. Required data reporting. Prerequisite: ENV 472.

**ENV 474 Senior Project Analysis and Presentation**
(F)(1-6-3)
Analysis and presentation of project data, including statistical, graphical, geospatial, and/or other scientific methods. Review, presentation, and manuscript development are required. Prerequisite: ENV 473; BIO 434 or MATH 362; or instructor consent.

**GEOG Geography**

**GEOG 105 Physical Geography**
(F)(3-3-4)
Comprehensive introduction to physical geography, including maps and representation of the earth's surface, the climate system and weather phenomena, plate tectonics, landform evolution and interpretation, and human-landscape interactions. Satisfies lab science.

**GEOG 106 Cultural Geography I**
(FW)(3-0-3) SS
Cultural geography of the major world developed regions other than the United States – Europe, Australia and New Zealand, the former Soviet Union, Canada and Japan. The course emphasizes the regional approach.
Courses with the following notation fulfill the appropriate general education requirements:

- Communication (C)
- Humanities (H)
- Humanities Performance (HP)
- Social Science (SS)

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

Introduction to horizontal and vertical curve computations.
Corequisite: MATH 111.

GME 162 Plane Surveying II
(S)(2-6-4)
Digital theodolites and data collectors, instrument testing and observational error analysis. Theory of leveling. Solar observation and computation. E.D.M. use and calibration. Field labs including solar observations, traversing, leveling and horizontal curve layout. Introduction to COGO software.
Prerequisites: GME 161, MATH 112.

GME 163 Route Surveying
(F)(2-6-4)
Laboratory intensive project overview including horizontal and vertical control for preliminary location and construction surveys for a secondary road. Instruction in basic elements of horizontal and vertical route alignment and layout. Determination of earthwork quantities. CAD drafting of plan, profile and cross-sections.
Prerequisites: GME 162, GME 175, both with grade “C” or better.

GME 175 Computations and Platting
(W)(2-3-3)
Coordinate geometry concepts with emphasis on solutions to standard surveying computations. Introduction to calculator and Excel spreadsheet computations. Introduction to map composition and platting using industry standard software.
Prerequisite: GME 161.
Corequisite: CE 203.

GME 241 Boundary Law I
(F)(3-0-3)
Statute law, common law, and legal principles relating to land boundaries. Each student will be required to use the county law library to research assigned cases.
Prerequisites: GME 161, WRI 121 or instructor consent.

GME 242 Land Descriptions and Cadastre
(W)(2-0-2)
Real property descriptions and land record systems. Emphasis on interpreting and writing land descriptions, and introduction to researching records in various Land Information Systems.
Prerequisites: GME 161, GME 241, both with grade “C” or better.

GME 264 Digital Design for Surveying
(W)(0-6-2)
Use of Carlson software to solve and plot assignments covering traverse calculations, horizontal and vertical curve alignments, profiles and earthwork volumes. Hand calculations will be made to supplement the computer solutions.
Prerequisites: CE 203, GME 163 with grade “C” or better.

GME 297 Seminar
(Hours to be arranged each term.)

GME 299 Independent Studies
(Hour to be arranged each term.)

GME 324 Geomatics Computer Programming
(F)(1-6-3)
Students develop Visual Basic programs and Excel spreadsheets to solve geomatics problems. Extensive use of Excel spreadsheets including developing custom functions and VBA extensions. Students are introduced to MS Access relational database, and develop a functioning geomatics database.
Prerequisites: GME 264, MIS 115.

GME 343 Boundary Surveys
(F)(2-6-4)
Planning, organizing, calculating and applying field procedures for boundary and cadastral surveys. Writing deed descriptions; researching public record systems relative to property boundaries.
Prerequisites: GME 163, GME 242, both with grade “C” or better.

GME 351 Construction and Engineering Surveying
(S)(2-3-3)
Organizing, planning and estimating costs for construction and engineering surveying projects. Field projects related to construction, layout of engineering works and site mapping.
Prerequisites: GME 163, GME 264.

GME 355 Digital Photogrammetry
(F)(2-3-3)
Introduction to Photogrammetry, topics include geometry of the vertical image, the stereo pair, and parallax computations. Aerotriangulation of image blocks, and project planning and mission design.
Students use Softcopy workstations to compile topographic maps.
Prerequisites: GME 264, MATH 252.

GME 372 Subdivision Planning and Platting
(S)(2-3-3)
Land use planning; governmental regulations as applied to subdivisions; subdivision planning, computations and preparation of subdivision plats.
Prerequisites: GME 242, GME 264, both with grade “C” or better.

GME 381 Advanced Cadastral Surveying I
(2-0-2)
History of United States land surveying and pertinent boundary law. Introduction to records research and boundary law principles; analysis of legal descriptions in deeds and other documents that transfer land title. Course utilizes BLM CFedS materials.
Prerequisite: Instructor permission, ability to perform standard surveying computations, an understanding of boundary law.

GME 395, GME 495 Cooperative Field Experience
(0-40-4)
An approved work program related to geomatics practice involving full-time meaningful activity. The employer, type of work and level of difficulty must be approved by the Geomatics Co-op Coordinator prior to the work period. Progress reports are prepared by the student during the work period and submitted for review. A comprehensive written report is required at the end of each co-op period. A co-op period may be three months for 2 credits or six months for 4 credits. A tuition fee is required for credits earned by co-op work experience.
Prerequisites: Completed freshman year and two terms residence.

GME 396, GME 496 Cooperative Field Practice
(0-40-2)
Three month, two credit hour version of GME 395 and GME 495.

GME 415 Advanced Road Design
(W)(2-6-4)
Complete road design project including “L” and “P” line locations; horizontal and vertical curve calculations with consideration of stopping and sight distances; earthwork and mass diagram calculations; drainage and road construction materials.
Prerequisite: GME 351.
Courses with the following notation fulfill the appropriate general education requirements:

- Communication (C)
- Humanities (H)
- Humanities Performance (HP)
- Social Science (SS)

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

HED 250 Contemporary Health Issues
(2-0-2)
Topics related to the maintenance of a healthy lifestyle. Emphasis on lifestyle choices and behavior patterns that affect one’s state of wellness. Topics include stress management; emotional, social, and spiritual well-being; nutrition, fitness and exercise; weight management; cardiovascular disease and cancer risk reduction; addictions; and other lifestyle-related health behaviors.

HED 260 Diet and Exercise for Lifetime Fitness
(2-0-2)
Practical concepts of nutrition and exercise, their role in disease risk, obesity, and weight control. Consumer concerns, advertising, fads, gimmicks. Fitness and dietary evaluations.

HED 275 Introduction to Sports Medicine
(S)(2-3-3)
An introduction to the principles and practice of sports medicine. Emphasis on the prevention and treatment of common sports injuries. Instruction includes understanding the basic mechanisms behind injury and practical experience in preventative measures and basic treatment.

(HIST) History

HIST 101, 102, 103 History of Western Civilization
(101-F)(102-W)(103-S)(3-0-3) SS
Development of Western civilization from early beginning to the present, with attention to political, economic, religious, social, and cultural factors. Courses need not be taken in sequence. HIST 101: From the origins of human civilization to 1000 A.D. HIST 102: From 1000 A.D. to 1789. HIST 103: From 1789 to the present.

HIST 107, HIST 207, HIST 307, HIST 407 Seminar
(Hours to be arranged each term.) SS

HIST 201, 202, 203 U.S. History
(201-F,W)(202-W)(203-S)(3-0-3) SS
The historical development of the United States, its economic, political, and social institutions from the colonial period to the present. Courses need not be taken in sequence. HIST 201: Pre-Columbian and colonial times to 1840. HIST 202: 1840, Westward expansion and the Civil War to 1899. HIST 203: 1900 to present.

HIST 224 Technology and the Ancient World
(F)(3-0-3) SS
The interaction of technology and world civilization from earliest times to 1500 A.D. Topics include the development of agriculture, urbanization, the place of technology in the Roman and Chinese empires, Medieval engineering, and the technological roots of globalization.

HIST 225 Technology and the Rise of the World
(W)(3-0-3) SS
The economic and social roots of Western dominance of the world economy after 1500. Topics include the Trans-Atlantic Exchange, the Industrial Revolution, urbanization, globalization, and the technological roots of colonialism.

HIST 226 Technology and the Modern World
(S)(3-0-3) SS
The interaction of technological change and world civilization in the 20th century. Topics include the role of corporations in technological change, the theory of Large Technological Systems (LTS), Cold War science and technology, and origins of the internet.

HIST 245 Hitler and the Holocaust
(W)(3-0-3) SS
Introduction to the history of the Holocaust, with a focus on the role of Adolph Hitler. Topics include Hitler’s life and political career, the social, technological and economic structure of the Holocaust, and Hitler and the Holocaust in popular culture.

HIST 275 Introduction to the History of Medicine
(F)(3-0-3) SS
Introduction to the history of medicine, with a focus on American medicine in the 19th and 20th centuries. Topics include medical professionalization, the social, technological and economic structure of the medical industry, and medicine in popular culture.

HIST 335 The Engineering Profession
(F,W)(3-0-3) SS
The emergence and development of the engineering profession in Europe and North America. Topics include the changing nature of the profession’s work and institutions, the role of engineering professional societies, the relationship between engineers, engineering technologists, and engineering technicians, and the place of engineers in society. Prerequisite: WRI 123 or WRI 227.

HIST 356 A History of Energy
(F,W,S)(3-0-3) SS
Study of the emphasis societies place on the development, safeguarding and exploitation of energy resources. Development of energy resources since the Industrial Revolution; exploitation of energy resources; oil shocks of the 1970s, glut of the 1980s; the modern energy paradigm. Prerequisite: WRI 123 or WRI 227.

HIST 357 History of the Electric Grid
(S)(3-0-3) SS
Study of the electric grid as a large technological system. Topics of study include the creation of the electric grid by Edison and others, rural electrification, the rise and fall of the utility consensus and the politics of deregulation. Prerequisite: WRI 123 or WRI 227.

HIST 392 Modern Asia
(S)(3-0-3) SS
China, Japan, and Korea from the early nineteenth century to the present. Emphasis on modern political movements and economic and cultural transformation. Prerequisite: WRI 123 or WRI 227.

HIST 452 Globalization and the Pacific Northwest
(ES)(3-0-3) SS
This seminar addresses globalization in the PNW. Topics include colonialism, mercantilism, markets, imperialism, and cultural exchange. PNW industries involved in globalization such as timber, fishing, agriculture, tourism, and oil will be examined. Social movements and protests will also be considered. Prerequisites: WRI 122
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
(MATH) Mathematics

Note: Unless otherwise indicated with F, W, S courses will be offered as often as requested.

MATH 20 Basic Mathematics
(3-0-3)
Operations with whole numbers, fractions and decimals. Ratio, proportion, and percent, with applications. Calculations using length, area, and volume. Estimation and unit conversion. Credits earned apply for enrollment (eligibility), but not apply toward a degree. An additional fee is required above regular tuition.

MATH 70 Elementary Algebra
(F/W)(4-0-4)
For students whose preparation contains no algebra background or whose placement examination scores do not qualify for entry into Intermediate Algebra. The topics covered stress the fundamental properties of algebra, solving equations, and manipulating algebraic fractions. Credits earned apply for enrollment (eligibility) but do not apply toward a degree. An additional fee is required above regular tuition.

Prerequisite: MATH 20 with grade “C” or better, or equivalent.

MATH 97 Algebra Review
(Su)(2-0-2)
Structured review for students whose Math Placement score may not reflect an accurate evaluation or students who want a refresher but do not require a math placement. The course has individualized directed study using a comprehensive programmed instructional technology. Course is graded P/W.

MATH 100 Intermediate Algebra
(F/W/S)(4-0-4)
Fundamentals of algebra, linear and quadratic equations, systems of equations, inequalities, functions and graphs, radicals and exponents, and stated problems. (May not be used for graduation credit.)

Prerequisite: MATH 70 with grade “C” or better, or equivalent.

MATH 101 Accelerated Algebra
(F/W)(70, 100, 111)(4-0-4)
An accelerated algebra course with topics ranging from Elementary Algebra (MATH 70) to College Algebra (MATH 111). For entering students with good high school algebra backgrounds. All students will start in Elementary Algebra, and may receive credit for one of MATH 70, MATH 100, or MATH 111, depending on individual level of achievement. An additional self-support course fee is required.

MATH 105 Collegiate Mathematics
(S)(4-0-4)
A variety of modern mathematical topics based on contemporary applications. Topics include combinatorics, probability, statistics, finance, matrices, and logarithmic and exponential functions.

Prerequisite: Intermediate Algebra with grade “C” or better.

MATH 107, MATH 207, MATH 307, MATH 407 Seminar
(Hours to be arranged each term.)

MATH 111 College Algebra
(F/W/S)(4-0-4)
Study of functions including graphs, operations and inverses. Includes polynomial, rational, exponential, logarithmic functions and their applications, and systems of equations.

Prerequisite: MATH 100 with grade “C” or better, or equivalent.

MATH 111A, MATH 111B College Algebra
(111A FW; 111B WS)(1-2-2)
For students requiring Math 111 but desiring to learn the material at a slower pace. Math 111 content covered upon completion of MATH 111A and MATH 111B.

Prerequisite: For MATH 111A–Math 100 with grade “C” or better, or equivalent.

Prerequisite: For MATH 111B–Math 111A with grade “C” or better.

MATH 112 Trigonometry
(F/W/S)(4-0-4)
The trigonometric functions and their applications. Topics include graphs, identities, trigonometric equations, vectors, and complex numbers.

Prerequisite: MATH 111 with grade “C” or better, or equivalent.

MATH 211 Fundamentals of Elementary Mathematics I
(4-0-4)
This is the first course in the mathematics sequence for prospective elementary teachers. Topics include problem solving strategies, set theory, numeration, computational algorithms for whole numbers and integers, estimation, relations; use is made of calculators and manipulatives.

Prerequisite: MATH 112 with grade “C” or better.

MATH 212 Fundamentals of Elementary Mathematics II
(4-0-4)
This is the second course in the mathematics sequence for prospective elementary teachers. Topics include decimals, percents, ratios and proportions, real numbers, probability and statistics; use is made of calculators and manipulatives.

Prerequisite: MATH 211 with grade “C” or better.

MATH 213 Fundamentals of Elementary Mathematics III
(4-0-4)
This is the third course in the mathematics sequence for prospective elementary teachers and covers basic geometry. Topics include geometric shapes and their properties, measurement, congruence and similarity, and coordinate and transformational geometry; use is made of calculators and manipulatives.

Prerequisite: MATH 211 with grade “C” or better.

MATH 221 Introduction to Computational Software
(W,S)(2-0-2)
Solve applied problems involving formulas, functions, summation and iteration using Excel and MATLAB. Use built-in functions and graphing capabilities of MATLAB and Excel. Do vector and matrix calculations and write function files using MATLAB. Write and execute macros in Excel.

Prerequisite: MATH 112.

MATH 243 Introductory Statistics
(F/W/S)(4-0-4)
Descriptive statistics, numerical and graphical presentation of data, estimation and margin of error, hypothesis testing, correlation; interpretation of statistical results. Cannot be taken for graduation credit by students who have taken MATH 361.

Prerequisite: MATH 100 or instructor's consent.

MATH 251 Differential Calculus
(F/W/S)(4-0-4)
Theory, computational techniques and applications of the derivative.

Prerequisite: MATH 112 with grade “C” or better, or equivalent.
Courses with the following notation fulfill the appropriate general education requirements:

**C** - Communication  **H** - Humanities  **HP** - Humanities Performance  **SS** - Social Science

**MATH 252 Integral Calculus**
(F,W,S)(4-0-4)
Computational techniques for and applications of the definite and indefinite integrals. Prerequisite: MATH 251 with grade “C” or better.

**MATH 253N Sequences and Series**
(F,S)(4-0-4)
Indeterminate forms and improper integrals. Infinite sequences and series, convergence, power series. Taylor series and applications. This course replaces MATH 254. Prerequisite: MATH 252 with grade “C” or better.

**MATH 254N Vector Calculus I**
(F,W,S)(4-0-4)
Vectors, vector functions, and curves in two and three dimensions. Surfaces, partial derivatives, gradients, and directional derivatives. Multiple integrals using rectangular and other coordinate systems. Physical and geometric applications. Prerequisite: MATH 252 with grade “C” or better.

**MATH 261 Introduction to Linear Algebra**
(W,S)(3-0-3)
Matrices and matrix operations, systems of linear equations, vectors in a geometric setting, projections, dot products, cross products, inverse matrices, determinants, linear transformations, Eigenvalues, Eigenvectors. Use of MATLAB or equivalent CAS and/or a graphing calculator required. Pre-or corequisite: MATH 251 or instructor consent.

**MATH 311 Introduction to Real Analysis**
(W)(4-0-4)
A one term stand-alone course on topics in real analysis, covering properties of real numbers, completeness axiom, continuity, convergence of sequences and series of numbers, convergence of sequences and series of functions. Emphasis will be placed on proofs. Prerequisites: MATH 253N and MATH 327, both with grade “C” or better.

**MATH 321 Applied Differential Equations I**
(F,W,S)(4-0-4)
The first in a two term sequence on the solutions of ordinary differential equations. Introduction to differential equations, first and second order equations with applications. Prerequisite: MATH 252 with grade “C” or better.

**MATH 322 Applied Differential Equations II**
(S)(4-0-4)
The second in a two term sequence on the solutions of ordinary differential equations. Introduction to systems of equations, the Laplace transform and series solutions. Prerequisites: MATH 321 and MATH 341.

**MATH 327 Discrete Mathematics**
(W,S)(4-0-4)
Introduction to proof and mathematical abstraction. Topics include sets, set operations, functions, relations, sequences, series, recurrence relations, mathematical induction, equivalence relations. Prerequisites: MATH 252, or junior standing and MATH 111, both with grade “C” or better.

**MATH 341 Linear Algebra I**
(F,W,S)(4-0-4)
The study of vectors and matrices in Euclidean space. Topics include sets, their geometric interpretations and application to systems of equations. Includes linear independence of vectors, basis and dimension, introduction to linear transformations, Eigenvalues and eigenvectors, diagonalization, determinants. Prerequisite: MATH 252 with grade “C” or better.

**MATH 342 Linear Algebra II**
(S)(4-0-4)
A continuation of the topics of MATH 341 to the setting of abstract vector spaces. Includes the study of orthogonality, inner product spaces, eigenvalues and eigenvectors, matrix decompositions and a more advanced study of linear transformations. Prerequisite: MATH 341.

**MATH 346 Number Theory**
(3-0-3)
A proof-based course in the theory of the integers, including divisibility, primes, Euclid’s Algorithm, Euler’s Theorem and an introduction to algebraic structures. The course also includes applications of number theory such as RSA encryption. Prerequisite: MATH 327 with grade “C” or better.

**MATH 347 Fundamentals of Abstract Algebra**
(S)(4-0-4)
Introduction to group theory and algebraic structures with applications. Prerequisites: MATH 254N, MATH 327, both with grade “C” or better.

**MATH 354 Vector Calculus II**
(W)(4-0-4)
Review of vector functions, space curves, gradients, and directional derivatives. Introduction to vector analysis: vector fields, divergence, curl, line integrals, surface integrals, conservative fields, and the theorems of Gauss, Green and Stokes with applications to force, work, mass, and charge. Prerequisite: MATH 254N with grade “C” or better.

**MATH 361 Statistical Methods I**
(F,W,S)(4-0-4)
Descriptive statistics, experimental design, introduction to probability, common probability distributions, random variables, sampling distributions, hypothesis testing and confidence intervals for means using one and two samples, simple linear regression. Prerequisite: MATH 111 or instructor’s consent.

**MATH 362 Statistical Methods II**
(W,S)(4-0-4)
Review of inferential statistics, analysis of variance one factor and two factor, simple and multiple regression, analysis of categorical data using tests and confidence intervals for proportions and chi-square tests, correlation, goodness of fit, non-parametric tests. Data sets used will come from various fields including: business, psychology, biology, environmental science, engineering, manufacturing and communication. Prerequisite: MATH 361 or instructor consent.

**MATH 371, MATH 372 Finite Mathematics and Calculus I, II**
(F,W,S)(4-0-4)
Linear functions, matrices, linear programming, mathematics of finance, derivatives and their applications. The integral and its applications, and calculus of several variables. (MATH 371 cannot be used for graduation credit by students who have taken MATH 251.) Prerequisite: For MATH 371–MATH 111 with grade “C” or better. Prerequisite: For MATH 372–MATH 371 with grade “C” or better.
MATH 411 Topics in Complex Analysis
(W)(4-0-4)
Complex numbers and functions, differentiation and integration, Cauchy's theorem and integral formula, Taylor and Laurent series, Residue theorem. Prerequisite: Math 254N.

MATH 421 Applied Partial Differential Equations I
(F)(4-0-4)
The first course in a three term sequence in applied partial differential equations. Modeling physical systems using differential equations, classifying differential equations and introduction to the methods of solving partial differential equations (separation of variables, Fourier series, transform methods). Prerequisite: MATH 322, MATH 254N.

MATH 422 Applied Partial Differential Equations II
(W)(4-0-4)
The second course in a three term sequence in applied partial differential equations. Introduction to solution techniques using eigenvalues and eigenfunctions. Presentation of eigenfunctions which form orthogonal bases such as Bessel functions and Legendre polynomials. Prerequisite: MATH 421, MATH 341 Corequisite: MATH 354.

MATH 423 Applied Partial Differential Equations III
(S)(4-0-4)

MATH 451 Numerical Methods I
(F,W)(4-0-4)
Computer applications of matrix methods, iterative solutions of equations, and systems of equations, polynomial interpolation and curve fitting, numerical differentiation and integration. Prerequisites: MATH 252, MATH 341 or MATH 261, and a programming language.

MATH 452 Numerical Methods II
(W)(4-0-4)

MATH 453 Numerical Methods III
(S)(4-0-4)

MATH 465 Mathematical Statistics
(W,S)(4-0-4)
Counting techniques, probability, discrete and continuous random variables and distribution functions, joint probability distributions; expected value, variance and covariance; decision making. Prerequisite: MATH 254N.

MECH 107, MECH 207, MECH 307, MECH 407 Seminar
(Hours to be arranged each term.)

MECH 160 Materials I
(2-3-3)
Survey of materials used in industry and their physical and chemical principles as they relate to structure, properties, corrosion, and engineering applications. Major consideration given to metal alloys. Introduction to polymers, ceramics and composites included. Prerequisite: CHE 221 or equivalent.

MECH 304, MECH 404 Co-op Field Practice
(Terms and hours to be arranged with approval of the curriculum coordinator.) An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

MECH 312 Dynamics II
(S)(3-0-3)
Continuation of the study of kinematics and kineics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers. Prerequisites: ENGR 212, MATH 321.

MECH 313 Thermodynamics II
(S)(3-0-3)
Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery. Prerequisite: ENGR 355.

MECH 315 Machine Design I
(S)(3-0-3)
Study of stress and fatigue analysis as applied to machine elements. Prerequisite: ENGR 213.

MECH 316 Machine Design II
(F,S)(3-0-3)
Application of stress and fatigue analysis in the design and selection of machine elements. Prerequisite: MECH 315.

MECH 318 Fluid Mechanics I
(F,W)(3-3-4)
Covers fluid properties, fluid statics, conservation laws of pipe flow, drag, lift fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, and forces due to fluid motion. Prerequisites: ENGR 211, PHY 221.

MECH 323 Heat Transfer I
(F,S)(3-0-3)
An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited. Prerequisites: MATH 321, MECH 318.

MECH 326 Electric Power Systems
(2-3-3)
Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices. Prerequisites: MECH 363 and ENGR 236.

MECH 351 Finite Element Analysis
(F,S)(2-3-3)
This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisite: MET 375
Pre- or Corequisite: MECH 315

**MECH 360 Engineering Materials II**
(W)(3-0-3)
This course extends the MET 160 Engineering Materials I course using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisite: MET 160 and CHE 201 or CHE 221

**MECH 363 Engineering Instrumentation**
(F)(2-3-3)
Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems are considered. Methods of calibration, correction, and data reduction are presented.

Prerequisite: ENGR 213, PHY 222.
Pre- or Co-requisite: ENGR 236

**MECH 375 Solid Modeling**
(2-3-3)
Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242

**MECH 405 Reading and Conference**
(Hours to be arranged each term.)

**MECH 414 Introduction to Aerodynamics**
(W)(3-0-3)
An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355, MECH 318.

**MECH 415 Design Project**
(2-3-3)
This course involves using material from prior course work in individual student projects.

Prerequisites: MECH 315, MECH 318, MET 242.
Pre- or corequisite: MECH 316

**MECH 417 Fluid Mechanics II**
(F)(2-3-3)
Fluid Kinematics, differential analysis, similarity and modeling, and compressible flow. Computational fluid dynamics is introduced.

An alternative to MECH 418. MECH 417 covers less topics/theory but does include a laboratory session.

Prerequisite: ENGR 355, MATH 321, MECH 318

**MECH 418 Fluid Mechanics II**
(F)(3-0-3)
A continuation of the study of the principles and applications of fluids in engineering, including: fluid kinematics, dimensional analysis and modeling, differential analysis of fluid flow, Navier-Stokes equations, compressible flow, open-channel flow, and turbomachinery.

An alternative to MECH 417. MECH 418 covers more topics/theory but does not include a laboratory session.

Prerequisites: ENGR 355, MATH 321, and MECH 318

**MECH 421 Introduction to Wind Tunnels**
(2-3-3)
An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: MECH 318, MECH 363

**MECH 427 Experiments in Thermodynamics**
(2-3-3)
Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MECH 313, MECH 363

**MECH 433 HVAC**
(F)(2-3-3)
Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation.

Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisite: MECH 323

**MECH 436 Classical Control Systems**
(S)(2-3-3)
An introduction to control systems. Both classic control theory and programmable logic controllers are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency responses along with control components and PLC programming.

Prerequisites: MECH 318, MECH 480

**MECH 437 Heat Transfer II**
(W)(1-3-2)
A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisites: MECH 323, MECH 363

**MECH 438 Reciprocating and Turbine Engines**
(3-0-3)
Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.

Prerequisites: MECH 313, MECH 315, MECH 318

**MECH 475 Parametric Modeling**
(W)(2-3-3)
Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.

Prerequisite: MET 375

**MECH 480 Mechanical Vibrations**
(W)(2-3-3)
An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.

Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, MECH 363

**MECH 490 Senior Projects I**
(F)(2-3-3)
The first of a three-term comprehensive group design project, focusing on the design proposal. This sequence applies material from
prior course work, along with concepts of project management, design optimization, and other material related to a group engineering project.
Prerequisites: ENGR 355, MECH 315, MECH 318, MET 375; or instructor consent.

MET 491 Senior Projects II
(W)(2-3-3)
The second of a three-term comprehensive group design project, focusing on project design.
Prerequisites: MECH 490, previous term from same instructor, or advisor and instructor consent.

MET 492 Senior Projects III
(S)(1-6-3)
The third of a three-term comprehensive group design project, focusing on project construction and testing.
Prerequisites: MECH 491, previous term from same instructor, or advisor and instructor consent.

(MET) Mechanical Engineering Technology

MET 107, MET 207, MET 307, MET 407 Seminar
(Hours to be arranged each term.)

MET 108 Geometric Dimensioning and Tolerancing
(2-0-2)
The study and application of ANSI geometric dimensioning and tolerancing principles relative to the preparation of engineering drawings.
Prerequisite: MET 241.

MET 160 Engineering Materials I
(F,W,S)(2-3-3)
Survey of materials used in industry and their physical and chemical principles as they relate to structure, properties, corrosion, and engineering applications. Major consideration given to metal alloys. Introduction to polymers, ceramics, and composites included.
Prerequisite: CHE 101 and 104, or CHE 201 and 204, or CHE 221

MET 218 Fluid Mechanics
(W,S)(3-3-4)
Covers fluid properties, laws of fluid statics, and fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, flow in ducts, forces due to fluid motion, and fluid machinery.
Prerequisites: MATH 112; PHY 201 or PHY 221.

MET 232 Thermodynamics
(F)(3-0-3)
An introductory course in thermodynamics. Develops understanding of energy, heat, work, efficiency, the ideal gas law, the first and second laws of thermodynamics and the general energy equation.
Prerequisites: MATH 252; PHY 202 or PHY 222.

MET 241 CAD for Mechanical Design I
(E,F,W,S)(1-3-2)
Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of 2-D drawings using current industry software. Topics include construction principles, input schemes, command structures, and data management.
Prerequisite: ENGR 111.

MET 242 CAD for Mechanical Design II
(E,F,W,S)(1-3-2)
Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of drawing sets using current industry software. Topics include detail part drawings, assembly drawings, and an introduction to 3-D drafting.
Prerequisite: MET 241.

MET 298 Reading and Conference
(Hours to be arranged each term.)

MET 299 Laboratory Practice
(Hours to be arranged each term.)

MET 304, 404 MET Co-op Field Practice
(Terms and hours to be arranged with approval of the curriculum coordinator.)
An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

MET 313 Applied Thermodynamics
(W,S)(3-0-3)
Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery.
Prerequisite: ENGR 355 or MET 232.

MET 315 Machine Design I
(E,F,W,S)(3-0-3)
Knowledge and skills developed in preceding courses are extended and applied to design and selection of machine elements and machines. Attention is given to functional requirements, methods of manufacture, choice of materials, and economic factors.
Prerequisites: ENGR 213 or ENGT 232; MET 160; PHY 201 or PHY 221.

MET 316 Machine Design II
(W,S)(3-0-3)
A study of power transmission systems components, their selection, and application to power transmission systems. Special consideration is given to the dynamic characteristics of the systems.
Prerequisite: MET 315.

MET 323 Heat Transfer I
(E,F,W,S)(3-0-3)
An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited.
Prerequisites: ENGR 355 or MET 232; MET 218.

MET 326 Electric Power Systems
(E,F,W,S)(2-3-3)
Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.
Prerequisite: ENGR 236 or EE 223.

MET 351 Finite Element Analysis
(W,S)(2-3-3)
This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.
Prerequisite: MET 375.
Pre- or corequisite: MET 315.
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

MET 360 Engineering Materials II
(F)(3-0-3)
This course extends the MET 160 Engineering Materials I course using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.
Prerequisite: MET 160

MET 363 Engineering Instrumentation
(F)(2-3-3)
Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems considered. Methods of calibration, correction, and data reduction presented.
Prerequisite: PHY 202 or PHY 222.
Pre- or Co-requisite: ENGR 236.

MET 375 Solid Modeling
(E,W,S)(2-3-3)
Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.
Prerequisite: MET 242.

MET 405 Reading and Conference
(Hours to be arranged each term.)

MET 414 Applied Aerodynamics
(W)(3-0-3)
An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.
Prerequisites: ENGR 355 or MET 232; MET 218.

MET 415 Design Project
(F,S)(2-3-3)
This course involves using material from prior coursework in individual student projects.
Prerequisites: MET 218, MET 315.
Pre- or corequisite: MET 316.

MET 416 Energy Systems
(F)(3-0-3)
Compares available energy resources by application of laws and principles of thermodynamics. Provides computational skills for assessment of a given resource with respect to a given application. Develops understanding of energy economics.
Prerequisites: ENGR 355 or MET 232; MET 326.

MET 417 Gas Laws
(F)(2-3-3)
Application of thermodynamics and fluid mechanics to the analysis of flow of both ideal and real gases in pipes, nozzles, diffusers, compressors and turbines. The course also emphasizes the use of appropriate instrumentation.
Prerequisites: MET 218, MET 313, MET 363.

MET 421 Wind Tunnel Technology
(W)(2-3-3)
An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.
Prerequisites: ENGR 355 or MET 232; MET 218, MET 363.

MET 426 Fluid Power Systems
(W,S)(2-3-3)
A mechanical approach to industrial hydraulic applications with emphasis on selection and function of hardware and interfacing of hydraulic systems with mechanical, fluidic and electrical/electronic controls.
Prerequisites: MET 218, MET 363.

MET 427 Experiments in Thermodynamics
(S)(2-3-3)
Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.
Prerequisites: MET 313, MET 363.

MET 433 HVAC
(W)(2-3-3)
Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.
Prerequisites: MET 313, MET 323.

MET 436 Control Systems
(E,W,S)(3-0-3)
An introduction to control systems. Both classic control theory and modern digital process control are considered. Topics include block diagrams, mathematical models, transfer functions, LaPlace transforms, frequency response along with control components and digital controllers.
Prerequisites: ENGR 212, ENGR 236, ENGR 355 or MET 232; MET 218, MET 363.

MET 437 Heat Transfer II
(E,W)(1-3-2)
A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.
Prerequisites: MET 323, MET 363.

MET 438 Reciprocating and Turbine Engines
(W,S)(3-0-3)
Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.
Prerequisites: MET 218, MET 313, MET 315.

MET 462 Vacuum Technology
(2-3-3)
An introductory course defining the role of high and ultra-high vacua in the process of high vacuum technology. Material will include such topics as vacuum pumping, vacuum gauging, processing of materials in a vacuum, evaporative deposition, sputtering, thin films, mass spectrometry, and leak detection.
Prerequisite: MET 417.

MET 465 Computational Strength of Materials
(3-0-3)
Advanced topics in structural mechanics using calculus and finite element approaches. Topics include stresses and deflections of non-uniform 2-d beams; shafts and connecting rods; axisymmetric shells; circular and rectangular plates; inertial stresses from rotation and seismic effects. Applications are emphasized.
Prerequisites: ENGT 230 and ENGT 231; or
ENGR 211 and ENGR 213; MET 351 and MATH 252.

**MET 475 Parametric Modeling**  
(W)(2-3-3)  
Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.  
Prerequisite: MET 375.

**MET 480 Vibrations**  
(FW)(2-3-3)  
An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.  
Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, MECH 363.

**MET 490 Senior Projects I**  
(F)(2-3-3)  
The first of a three-term comprehensive group design project, focusing on the design proposal. This sequence applies material from prior coursework, along with concepts of project management, design optimization, and other material related to a group engineering project.  
Prerequisites: ENGR 355 or MET 232; MET 218, MET 315 and MET 375; or instructor consent.

**MET 491 Senior Projects II**  
(W)(2-3-3)  
The second of a three-term comprehensive group design project, focusing on project design.  
Prerequisite: MET 490 previous term from same instructor, or advisor and instructor consent.

**MET 492 Senior Projects III**  
(S)(1-6-3)  
The third of a three-term comprehensive group design project, focusing on project construction and testing.  
Prerequisite: MET 491 previous term from same instructor, or advisor and instructor consent.

(MFG) Manufacturing Engineering Technology

**MFG 101 Introduction to Manufacturing**  
(S)(2-3-3)  
An introduction to the manufacturing engineering technology discipline. Orientation to the use of personal computers. Instruction in problem solving and laboratory procedures emphasized. Laboratory provides demonstration and practice in a variety of manufacturing equipment and procedures.

**MFG 103 Introductory Welding Processes**  
(FW,S)(2-3-3)  
Applications of welding in modern industry. Topics include: Oxyacetylene welding and cutting, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, and robotic welding.

**MFG 107, MFG 207, MFG 307, MFG 407 Seminar**  
(Hours to be arranged each term.)

**MFG 112 Introduction to Manufacturing Processes**  
(W)(3-0-3)  

**MFG 120 Manufacturing Processes I**  
(F,W,S)(2-6-4)  
An introductory course in metal removal processes emphasizing drilling, milling, and lathe processes. Includes tool bit grinding. Emphasis on production speeds and feeds.  
Prerequisites: MATH 100, ENGR 111.

**MFG 204 Data Management**  
(2-0-2)  
Current topics in data acquisition and management.

**MFG 220 Manufacturing Processes II**  
(W)(2-3-3)  
Advanced concepts in material removal.

Turning, milling, shaping, and drilling. Cutting tools and cutting requirements.  
Prerequisites: MET 160, MET 241, MFG 120.

**MFG 223 Casting and Molding Processes**  
(S)(3-3-4)  
Casting and molding processes including: pattern making, casting and molding methods, mold and core making, pouring, cleanup, sand conditioning and testing, quality considerations and economic factors.  
Prerequisites: ENGT 115, MET 160.

**MFG 245 Electronics Manufacturing**  
(F)(3-0-3)  
Processes and materials specific to the production of printed circuit board and integrated circuit components. Topics include surface mount technology, vacuum system theory, photolithography, etching and deposition processes, microbonding, and component packaging.  
Prerequisites: CHE 101, MET 112.

**MFG 275 CAD for Manufacturing**  
(2-3-3)  
Computer aided drafting for manufacturing. Presents equipment and programs from the user's perspective. Topics include construction principles, input schemes, command structures, and data management.  
Prerequisite: One computer language.

**MFG 295 Individual Studies**  
(Hours to be arranged each term.)

**MFG 298 Reading and Conference**  
(Hours to be arranged each term.)

**MFG 299 Laboratory Practice**  
(Hours to be arranged each term.)

**MFG 313 Manufacturing Analysis and Planning**  
(F,S)(3-0-3)  
Analysis and planning of manufacturing methods, procedures and equipment. Includes designing for manufacturing efficiency, tolerance analysis, equipment and resource allocation and scheduling.  
Prerequisite: ACC 333 or MGT 321 or MFG 120.

**MFG 314 Geometric Dimensioning and Tolerancing**  
(F,S)(2-3-3)  
The study and application of ANSI and ISO
Courses with the following notation fulfill the appropriate general education requirements:

- Humanities
- Humanities Performance
- Social Science

For more information, see page 31

geometric dimensioning and tolerancing principles and practices relative to product design and manufacturing operations.

Prerequisites: MATH 112, MET 242.

**MFG 317 Machine Element Design**

(F)(3-0-3)

Stress calculations and design of machine elements for general applications. Theories of failure, fatigue considerations, and material selection of shafts and associated parts, gear and belt drives, bearings, power screws, threaded fasteners, riveting, welding, and springs.

Prerequisites: ENGR 213 or ENGT 231 and MET 241, or instructor consent.

**MFG 325 Principles of Metrology, Machining and Welding**

(3-3-4)

Measuring techniques using precision devices. Metal removal processes such as lathe, mill, and grinder. Correct use of tools and cutting parameters. Basic welding processes and theory.

**MFG 326 Solid Mechanics**

(3-0-3)

Concentrated study of statics and strength of materials comprising the principles of equilibrium, strain-stress relationships, and analysis of internal stresses for different loading systems.

Prerequisite: MATH 112.

**MFG 331 Industrial Controls**

(W,S)(2-3-3)

Fundamentals of control of manufacturing processes. Applications of relay logic, input and output devices, and programmable logic controllers (PLC). Design of complete control circuits, selection of components, and cost estimation, PLC programming for discrete event control and for analog applications.

Prerequisite: MET 326.

**MFG 333 Statistical Methods for Quality Improvement**

(F,W,S)(3-0-3)


Prerequisite: MATH 361.

**MFG 334 Manufacturing Group Project**

(W,S)(1-6-3)

Development of a product by a group of manufacturing students working together. This includes creating or modifying the design of the product, writing operation sheets, specifying materials, tools and equipment needed, design of special tooling, setup and operation of equipment and actual manufacturing of the project.

Prerequisite: MFG 342.

**MFG 341 Numerical Control Programming**

(F)(2-3-3)

Introduction to manual numerical control programming. Includes interpreting part drawings, process planning, machining setup and sequence. Program debugging and introduction to tool path simulation and computer-aided programming tools.

Prerequisites: MATH 112, MFG 120, MET 241.

**MFG 342 Computer Aided Machining**

(W,S)(2-3-3)

Development of CNC machine tool manufacturing programs using computer-aided process planning and advanced CAD/CAM software. Emphasis on analysis and planning required for successful CNC production, development of CAD drawings and solid models for CAM program development, toolpath simulation, and manufacturing engineering issues.

Prerequisites: MFG 341, MET 375.

**MFG 343 Manufacturing Tool Design**

(W)(3-0-3)


Prerequisites: MET 241, MET 315, MFG 314, or instructor consent.

**MFG 344 Design of Manufacturing Tooling**

(S)(2-3-3)

Using material from prior courses students work in individual and team design projects. Design and analyze a variety of manufacturing fixtures, jigs, molds, and stamping dies.

Prerequisites: MET 241, MFG 343.

**MFG 351, MFG 352, MFG 353 Microelectronics Manufacturing Processes I, II, III**

(3-0-3)

A three term sequence providing in-depth theory of the processes used in the manufacture of electronic components. Primary topics include integrated circuits, printed circuits, electronic assembly, Vacuum system theory, photolithography, process specific chemistry, etching and deposition processes, and surface mount technology.

Prerequisites: For MFG 351–CHE 101, PHY 202.

Prerequisite: For MFG 352–MFG 351. Pre-

requirement: For MFG 353–MFG 352.

**MFG 404 Co-op Field Practice**

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student’s field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MFG 405 Reading and Conference**

(Hours to be arranged each term.)

**MFG 408 Workshop**

(Hours to be arranged each term.)

**MFG 415 Finishing Methods**

(F)(2-0-2)

Review of material finishing technologies with focus on functional requirements of final product, life-cycle environmental considerations, and manufacturing technologies for material finishing.

Prerequisite: MET 160.

**MFG 420 Manufacturing Processes III**

(W)(3-0-3)

Introduction to less conventional and recently developed manufacturing processes and materials. Emphasis on understanding unique characteristics, advantages, limitations, and applications. Analysis required for selection of appropriate materials and processes. Examples of computer programs that aid the selection process.

Prerequisites: MATH 112; and MFG 220 or MFG 325; and PHY 201/PHY 221.
MFG 425 Plastic Manufacturing Processes  
(S)(2-3-3)  
Fundamentals of polymer science and plastic manufacturing methods. Introduction to the affect of chemistry and morphology of plastics on material selection, product design, and process design. Emphasis is on thermoplastic processes such as injection molding. Prerequisites: MET 160 and MET 375, or instructor consent.

MFG 445 Plant Layout and Handling Systems  
(3-0-3)  
In-depth study of facilities planning for manufacturing engineers. Focus is on layout optimization algorithms and applications, work cell design, warehouse design, materials handling systems, process/product/material/labor cost estimates and evaluations, and agile manufacturing. Prerequisites: MFG 112, MFG 313.

MFG 447 Lean Manufacturing  
(W,S)(2-3-3)  
Introduction of principles, techniques and skills of lean manufacturing. Process optimization and quality improvement for manufacturing. Plant layout, design and job scheduling. JIT skills, such as Kaizen, Kanban, value added analysis and one piece flow to reduce inventory and waste. Prerequisites: MFG 313 or MFG 333.

MFG 453 Automation and Robotics in Manufacturing  
(F,S)(2-3-3)  
Study of the appropriate level of manufacturing automation based upon economics and productivity. Discussion of robotics and a study of automated manufacturing including automatic machine design and material handling. Prerequisite: Senior standing in MET or MfgET or permission of instructor.

MFG 454 Thermal Systems for Manufacturing  
(F,S)(3-0-3)  
Fundamentals of thermal energy analysis, including introduction to thermodynamics and heat transfer. Emphasis is on solving manufacturing related problems in thermal process control and analysis. Prerequisite: MATH 252.

MFG 456 Materials Science  
(3-0-3)  
Study of the relationship of a material’s structure to its properties. Materials studied include nonferrous metals, polymers, ceramics, composites, and electronics materials. Prerequisite: MFG 420.

MFG 461 Senior Project I  
(F)(1-6-3)  
The first term of the three-term comprehensive capstone manufacturing project. This term concentrates on the development and presentation of a formal project proposal, followed by early stages of project development. Prerequisites: MFG 313, MFG 331, MFG 342 or instructor consent.

MFG 462 Senior Project II  
(W)(0-9-3)  
The second term of a three-term project. This term concentrates on material acquisition and process development. Prerequisite: MFG 461.

MFG 463 Senior Project III  
(S)(0-9-3)  
The final term of a three-term project. Process refinement and production of the product agreed to during the proposal phase. Requires formal reporting and presentation. Prerequisite: MFG 462.

MFG 465 Advanced Welding Methods  
(F,S)(3-0-3)  
High energy density, solid state, and plastics welding processes. Welding metallurgy supports, metal combination choices and solutions to typical welding problems. Codes, procedure qualification, welding design and nondestructive testing. Prerequisites: MET 160, MFG 103.

MFG 503 Thesis  
(F,W,S)(Variable credit 1-16)  
Course may be repeated for credit.

MFG 507 Seminar  
(Hours to be arranged each term.)

MFG 521 The Manufacturing Management Team in the Global Enterprise  
(S)(3-0-3)  
Concepts and theories needed to understand the management of people, work groups, and organizations in a global environment. Exploration of cultural differences, organizations, communication and business relationships; strategic thinking in a global context, and international e-communications. Emphasis on contemporary case studies regarding the operational problems facing the international firm.

MFG 522 Manufacturing Business Philosophies  
(s)(3-0-3)  
Contemporary world class manufacturing concepts and philosophies including Just-in-Time (JIT) applications for manufacturing and inventory management; methods and practices of total quality control in manufacturing; and continuous improvement techniques in manufacturing. Focus on contemporary cases in global manufacturing.

MFG 523 Capitalization Principles for Manufacturing  
(3-0-3)  
Theory and concepts of capitalization for manufacturing assets; land, buildings, and equipment. Historical cost for valuing an asset. Net income, real and tax depreciation, and timing the disposal or exchange of assets. Exploration of capitalization of cost, post-acquisition asset costs, interest capitalization and expense, asset impairments, and multinational capital budgeting and financial management.

MFG 524 Project and Budget Planning for Manufacturing  
(W,S)(3-0-3)  
Exploration of the theories, tools, and techniques needed to effectively plan and manage manufacturing projects and budgets. Development of the characteristics of project plans including scope of work statements, work breakdown structure, project schedules, schedule and budget metrics, and project change cost analysis. Core topics include cost, time, and resource estimation, management and budgeting.

MFG 525 International Economics for Manufacturing  
(3-0-3)  
Exploration of international economics. Impact on manufacturing industries. Focus on the foundations of international trade including classical and modern theories of production and industrial organization. Free trade policies; foreign competition; direct foreign investment, fiscal and monetary policy; tariffs, quotas, and subsidies. International monetary market on production, and
Courses with the following notation fulfill the appropriate general education requirements:

- Humanities
- Communication
- HP - Humanities Performance
- SS - Social Science

For more information, see page 31

anti-globalization politics. Concentration on contemporary cases in manufacturing. Prerequisites: ECO 201 and ECO 202 or equivalent (See instructor).

**MFG 531 Engineering Mechanics**
(S)(3-0-3)

**MFG 533 Thermal Processes and Technology in Manufacturing**
(F)(3-0-3)

**MFG 534 Design Technology for Manufacturability**
(F)(3-0-3)
Cutting costs and improving productivity. Managing the manufacturing supply chain. Reducing time to market. Establishing core competencies and maintaining vital corporate best practices. The role of standards and lean manufacturing in design.

**MFG 535 Product Life Software**
(F)(3-0-3)
Use of high-end enterprise-wide software products for integrating design, automating the workflow, and comprehensively controlling security. Revision management over all types of data. Creating document links. Leveraging subject matter experts across the extended enterprise.

**MFG 536 Automated Technology for Tool Path Generation**
(F)(3-0-3)
Reviewing and validating manufacturing processes for administrators, managers, and designers. Reviewing the creation of tool paths using standard 3D and 2D mechanical design tools and the generative 2.5-axis and 3, 4 and 5-axis surface machining NC software tools. Controller, machine, and software selection and integration.

**MFG 537 Product Data Management and Configuration Control**
(3-0-3)
Capturing intellectual property at its source from CAD design, manufacturing and maintenance, driving the product information across the extended enterprise, and enabling its use in other branches and partners in the enterprise. Creating the integration of better and more efficient decisions and processes over the life cycle of the product.

**MFG 538 Special Problems in Manufacturing Software**
(W,S)(3-0-3)
Independent study using advanced functionality in high-end manufacturing and enterprise software. Approval of faculty advisor required.

**MFG 562 Advanced Materials Science and Technology**
(F)(3-0-3)
Advanced engineering materials. Recent advances in development and applications of metals, polymers, ceramics, and composites. Emphasis on the relationship between structure and properties. Manufacturing processes explored. Application of established standards for materials properties determination.

**MFG 563 Inventory Control and Production Planning**
(3-0-3)
Introduction of concepts, principles, techniques, strategies and applications related to demand forecasting, production planning, performance measurements, quality control, inventory control and continuous improvement for manufacturing systems.

**MFG 564 Quality Concepts and Philosophies**
(3-0-3)

**MFG 595 Selected Graduate Topics in Manufacturing**
(3-0-3)
Manufacturing related topics in engineering science and design. Manufacturing related topics in software and computer integration. Manufacturing related topics in materials and processing technology. Manufacturing related topics in business and management. Course may be repeated for credit.

**MFG 596 Selected Topics in Engineering Science and Design Technology**
(F,W,S)(3-0-3)
Manufacturing related topics in engineering science and design. Course may be repeated for credit.

**MFG 597 Selected Topics in Manufacturing Software and Computer Integration**
(F,W,S)(3-0-3)
Manufacturing related topics in software and computer integration. Course may be repeated for credit.

**MFG 598 Selected Topics in Advanced Manufacturing Materials and Processes Technology**
(ES)(3-0-3)
Manufacturing related topics in materials and processing technology. Course may be repeated for credit.

**MFG 599 Selected Topics in Business, Financial and Management Processes**
(ES)(3-0-3)
Manufacturing related topics in business and management. Course may be repeated for credit.

**(MGT) Management**
MGT 107, MGT 207, MGT 307, MGT 407 Seminar
(Hours to be arranged each term.)

**MGT 212 Fundamentals of Renewable Energy Management**
(3-0-3)
Explores primary energy sources available for power generation. Includes cost comparisons of traditional sources (gas, coal, nuclear, hydro) and renewable sources (solar, geo-thermal, wind, biofuels, wave and tidal). Evaluates and benchmarks benefits of traditional versus renewable energy sources, long-term vs. short-term feasibility and strategic decision-making in energy generation and...
utilization.
Prerequisites: ACC 201 and REE 201.

MGT 321 Operations Management I
(F,W)(3-0-3)
Functions of the operations division within the organizational structure. Manufacturing and service organization trends. Capacity planning with forecasting and master scheduling. Introduction to Just-In-Time concepts. Prerequisite: BUS 215, BUS 317 or BUS 304.

MGT 322 Operations Management II
(W,S)(3-0-3)
Supply chain management for service and manufacturing companies. Covers flows of goods and services through relationships with business customers, suppliers and partners. Students learn how to manage strategic, operational and tactical planning using best-known practices and efficient use of information systems. Evaluate and design effective supply chains. Prerequisite: MGT 321.

MGT 323 Operations Management III
(F,W,S)(3-0-3)
Effective budgeting methods for industrial environments. Budget planning, formation and cost controls. Flexible budgets and expense management. Manufacturing/non-manufacturing costs and cost/contribution analysis. Prerequisite: ACC 203 with grade “C” or better.

MGT 335 Project Management
(ES)(3-0-3)
Advanced application of the Critical Path Method to organization and control of project implementation. Applications software will be used to create and evaluate project networks and to develop management reports. Prerequisite: BUS 215 or BUS 317 or MET 112.

MGT 345 Engineering Economy
(F,W,S)(3-0-3)
Capital expenditure, economic life and replacement analysis based on net present value, periodic costs, internal and incremental rates of return. Coverage of compound interest, value flows, economic equivalences, depreciation, taxes and inflation. Prerequisite: MATH 105 or MATH 111.

MGT 391, MGT 392 Co-op Field Practice
(0-9-3)
Credit will be given for an approved work program related to the student’s field of specialization for a continuous 10-week period. The employer and the type, level and difficulty of the particular job must be approved by the Management Department prior to employment.

MGT 421, Quality Management
(F,W)(3-0-3)
Qualitative and quantitative methods of quality assurance in manufacturing and service industries. Assessing quality systems using the ISO 9000 series of standards. Application of basic statistical techniques including control charts, sampling procedures, and graphical analysis to assess quality performance. Use of computing systems in establishing quality assurance. Prerequisite: MATH 361

MGT 422, Materials Management
(W,S)(3-0-3)
Approaches to materials management common to production and service industries. Demand forecasting, inventory management, scheduling, requirements planning and capacity planning using qualitative and quantitative methods. Application of computing systems in materials management processes. Prerequisite: MGT 321

MGT 423 Logistics Management
(ES)(3-0-3)
Approaches to warehousing practices and distribution of goods and services across the supply chain. Warehouse justification and decisions. Procurement, packaging, handling, transport and ownership arrangements. Relationship management, sustainability and risk assessment. Prerequisite: MGT 322

MGT 461 Lean/Six Sigma Management I
(F,W)(3-0-3)
Lean thinking as applied to production and service operations. Kaizen, kaikaku, pull production and systems, value stream mapping and analysis. Standardized work charts and combination tables to streamline work content and achieve flow. Identifying sources of muda and its elimination. Prerequisite: BUS 215 or MGT 321.

MGT 462 Lean/Six Sigma Management II
(W,S)(3-0-3)
Overview course of Six Sigma management roles, responsibilities and terminology. Students will understand the tools and the phases of the DMAIC model and explore business cases to understand how Six Sigma techniques are applied to business. Prerequisite: MATH 361.

MIS 101 Word Processing Software Laboratory
(F,W,S)(0-3-1)
Word processing lab using Microsoft Word software. Includes creating and editing documents, letters, Web pages, forms, labels, and newsletters, research papers, an index and table of contents.

MIS 102 Spreadsheet Software Laboratory
(F,W,S)(0-3-1)
Spreadsheet lab using Microsoft Excel software. Includes creating worksheets, charts, formulas, functions, what-if analysis, sorting, multiple worksheets, workbooks, templates, pivot tables and importing of data.

MIS 103 Presentation Graphics Software Laboratory
(ES)(0-3-1)
Presentation graphics lab using Microsoft PowerPoint software. Creation of presentations for use on paper, overhead transparencies, on a projection device, and Internet virtual presentations. Includes use of text, graphics, charts, and multimedia applications to create professional-looking presentations.
Courses with the following notation fulfill the appropriate general education requirements:

- Humanities        HP - Humanities Performance
- Communication
- Social Science

MIS 107, MIS 207, MIS 307, MIS 407 Seminar
(Hours to be arranged each term.)

MIS 113 Introduction to Database Systems
(F,S)(2-3-3)
Introduces concepts of desktop computer-based database systems. Topics include database management issues, database design, creating and maintaining a database, normalization, table structures, and creating user queries, reports, and forms. Basic database security is discussed.

MIS 115 Visual BASIC Programming
(F,W)(3-3-4)
Computer concepts and problem solving methods in the Windows environment using Visual BASIC. Topics include algorithms, simple data types, condition and iterative structures, functions and procedures, and the program documentation.
Prerequisite: MATH 100 or instructor consent.

MIS 116 C++ Programming I
(W)(3-3-4)
Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed CST 116.
Prerequisite: MATH 100 or instructor consent.

MIS 118 Programming Fundamentals
(F,W,S)(3-3-4)
Computer concepts and problem solving methods in the Windows environment using C# programming language. Topics include: algorithms, simple data types, condition and iterative structures, functions and procedures, and the program documentation.
Prerequisite: MATH 100 or instructor consent.

MIS 126 C++ Programming II
(F)(3-3-4)
Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed CST 126.

Prerequisite: MATH 100 or instructor consent.

MIS 130 Computer Organization
(3-3-4)
Introduces number systems, Boolean algebra, digital logic, computer arithmetic, instruction sets, memory, system software, and network organization and architecture. Laboratory exercises on digital logic, computer architecture, machine language and assembly language programming. Completion of a programming project.
Corequisite: MATH 100.

MIS 136 Object-Oriented Programming with C++
(F)(3-3-4)
A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed CST 136.
Prerequisite: MIS 126, with grade “C” or better.

MIS 145 Introduction to PC Hardware/Software
(F,W)(3-3-4)
An introduction to PC hardware and software that prepares students as an entry-level PC technician. The course covers topics including: PC system components, peripheral devices, data storage, networking, printing, mobile devices, operating system installation and management, file management, basic data security, and the troubleshooting process.

MIS 206 Introduction to Management Information Systems
(F,W,S)(3-0-3)
Introduction to key components in information systems. Identification of major hardware components and primary categories of software applications. Data resource management concepts; elements of how information systems work to support problem solving and business opportunities. Ethics of information systems usage.

MIS 215 Business Application Programming
(W,S)(3-3-4)
Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.
Prerequisites: MIS 115 and MIS 275 with grade “C” or better, or instructor consent.

MIS 218 Database Programming
(F,S)(3-3-4)
Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.
Pre-Req: MIS 275 and MIS 118 with a “C” or better.

MIS 225 Business on the Internet
(F,S)(3-3-4)
The role of the Internet and related technologies in modern business and electronic commerce. Hands on course for creating dynamic Web pages. Emphasizes Internet marketing and Web page editor with hypertext markup language (HTML) with some exposure to Java Script.

MIS 251 Networking I
(F,S)(3-3-4)
Introduction to voice and data networking concepts and technologies, including network types, common network standards, network interface cards, wired and wireless network components, IP addressing and sunbathing, network protocols, basic network security, and troubleshooting common network issues.
Prerequisite: MIS 145 with grade “C” or better.

MIS 255 Health Informatics Concepts and Practices
(F,W)(3-0-3)
The discipline of health informatics is introduced, including history, knowledge of health informatics, data management, vocabularies, standards and tools as applied in the support of health care delivery. The course provides foundation knowledge and understanding of the impact of information technology on the health care industry and vice versa. Particular attention is paid to the design, usage and acceptance of information technology applications. This course introduces students to the concepts and practices of health informatics.
Courses with the following notation fulfill the appropriate general education requirements:

- **C** - Communication
- **H** - Humanities
- **HP** - Humanities Performance
- **SS** - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication H - Humanities HP - Humanities Performance SS - Social Science

Solving and decision assistance.
Prerequisites: MIS 102, MATH 361 and MATH 371.

MIS 385 NoSQL
(S)(2-3-3) Develop concepts and a fundamental skill set of NoSQL and document-oriented data models. Conducting cross comparison between relational and document-oriented data models. Students will gain a broader understanding of DBA techniques used in managing database systems through replication and sharding approaches.
Prerequisite: MIS 341 with a grade of a “C” or better.

MIS 390, 490 Co-op Field Experience (Hours to be arranged each term.) An approved work program related to the student’s field of specialization for a continuous three-month or six-month period. The employer type, level, and difficulty of the particular job must be approved by the student’s advisor prior to the employment period. A written comprehensive report of activities must be submitted during the following term of residence. Prerequisites: All MIS 100 and 200 level courses.

MIS 405 Reading and Conference (Hours to be arranged each term.)
MIS 408 Workshop (Hours to be arranged each term.)

MIS 414 Information Systems Development (F,W,S)(2-3-3) Review of systems analysis. Tools, techniques, and reference sources used to research, configure and justify the hardware, software, staff, and facilities required for a computer system. Changeover, file conversion and testing. Post-installation audit, backup, security and privacy.
Prerequisites: MIS 312 and a programming language.

MIS 425 Information Systems Security (S)(3-3-4) An overview of security challenges and strategies of countermeasure in the information systems environment. Topics include definition of terms, concepts, elements, and goals incorporation industry standards and practices with a focus on availability, vulnerability, integrity, and confidentiality aspects of information systems.
Prerequisite: MIS 251, MIS 273

MIS 442/542 Advanced Database Application Programming (S)(3-3-4) Construct graphical end-user interfaces for scalable, high-performance Internet applications. Building, testing, debugging and deploying interactive Internet applications that use an enterprise level Database Management System. Develops experience with the System Development Life Cycle (SDLC) for web/database integration for application development. Develop understanding and application of Software as a Service (SaaS).
For graduate credit students will participate in a field placement project working with companies such as the BLM to create a working application demonstrating mastery of the subject material.
Prerequisites: MIS 218 and MIS 341, both with grade “C” or better.

MIS 445 Legal, Ethical and Social Issues in Health Care Technology (S)(3-0-3) Legal, ethical, and social issues in health care, especially as they impact systems design, development, use, and management will be examined.
Prerequisites: BUS 313.

MIS 446 Data Mining
(W)(2-3-3) Defining the project cycle of data mining through data collection, analysis and assessment. Classification, Clustering, Association, Regression, Forecasting, Sequence Analysis and Deviation Analysis are applied to the project life cycle of data mining applications.
Prerequisites: MIS 344 and MIS 334 both with a “C” or better.

MIS 451 Networking III (F,W,S)(3-3-4) Focus on technologies and tools used in advanced enterprise networks. Includes project labs using network infrastructure to implement design goals and team projects.
Prerequisite: MIS 351

MIS 450 Senior Project Selection (S)(1-0-1) Selection of the senior project capstone project concept that meets industry demands and stakeholders requirement.
Prerequisite: MIS 322 with a “C” or better or Advisor’s Consent

MIS 496 Senior Project Management (F,S)(2-3-3) Focuses on project management. Includes best-known industry practices, as well as planning, organizing and managing resources to bring about successful completion of specific project goals and objectives. Produces formal proposal for Senior Project.
Prerequisites: MIS 495 with a “C” or better.

MIS 497 Senior Project II (W)(1-6-3) Senior project students will plan, develop and carry through to completion a management information systems project for a client they select. Formal proposal, progress reports and project demonstration/presentation. The instructor serves as the student’s consultant.
Prerequisite: MIS 496 with grade “C” or better.

MIS 498 Senior Project III (F,S)(1-6-3) Senior students plan, develop and complete a project for a client or an independent research project. Periodic progress reports and presentations required. Instructor functions as a consultant. Deliver final project.
Prerequisite: MIS 497 with grade “C” or better.

(MIT) Medical Imaging Technology

MIT 103 Introduction to Medical Imaging (F,W,S)(3-0-3) Orientation to the art and science of medical imaging. History and development of radiologic science, diagnostic medical sonography, vascular technology, nuclear medicine technology, medical ethics, health care industry, related professional organizations, and regulatory agencies.

MIT 107, MIT 207, MIT 307, MIT 407 Seminar (Hours to be arranged each term.)

MIT 209 PACS I: Intro to Picture Archiving Communications System (F)(3-0-3) An introduction to Picture Archiving
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication     H - Humanities     HP - Humanities Performance     SS - Social Science

For more information, see page 31

Communications System (PACS). PACS Workflow within the department and interdepartmentally. PARCA and CIIP certification, procurement, and PACS system administration.

MIT 219 PACS II: PACS Communication and Administration  
(F)(3-0-3)  
Study of policies and procedures for PACS. Observation of the healthcare organization and PACS role within the organization. Overview of PACS components, image acquisition, viewing of images, and image archiving.

MIT 229 PACS III: PACS Technical Requirements and Image Quality  
(W)(3-0-3)  
Overview of computer basics, technical requirements, and Operating System basics. An introduction to HIPAA and PACS image quality.

MIT 231 Sonographic Principles and Instrumentation I  
(F,W,S)(3-3-4)  
Properties of sound waves, propagation and interaction of ultrasound in tissue, basic ultrasound instrumentation, static, and real time ultrasound imaging principles and artifacts are covered. Laboratory includes demonstration of wave characteristics and introduction to basic instrumentation of real-time ultrasound imaging. Satisfies Science elective. Prerequisite: PHY 217 with grade “C” or better.

MIT 232 Sonographic Principles and Instrumentation II  
(S)(3-3-4)  
Advanced physical principles. Hemodynamics, Doppler physics, color imaging, and artifacts associated with them are covered. Digital signal and image processing and bio effects are also discussed. Laboratory develops instrumentation skills. Satisfies Science elective. Prerequisite: MIT 231 with grade “C” or better.

MIT 239 PACS IV: PACS Implementation and System Management  
(W)(3-0-3)  
Overview of implementing PACS. Starting from procurement to the Return on Investment (ROI). This will include the proposal, approval process, integration, a post install. Class will include the study of DICOM and HL7.

MIT 249 PACS V: DICOM  
(S)(3-0-3)  
Study of DICOM standard and how it allows for modalities to communicate inside and outside of a facility.

MIT 259 PACS VI: PACS Security  
(S)(3-0-3)  
Overview of Information Technology, IHE, security, structured reporting and networking fundamentals.

(MUS) Music  
MUS 107, MUS 207, MUS 307, MUS 407 Seminar  
(Hours to be arranged each term.) H

MUS 195 Band  
(0-3-1) HP (One hour each term.)

MUS 197 Chorus  
(0-3-1) HP (One hour each term.)

(NMT) Nuclear Medicine Technology  
NMT 107, NMT 207, NMT 307, NMT 407 Seminar  
(Hours to be arranged each term.)

NMT 205 Nuclear Medicine Administration  
(W)(2-0-2)  
Orientation to the principles of management, marketing nuclear medicine services, and administrative procedures. Prerequisite: MIT 103 with grade “C” or better.

NMT 212 Nuclear Medicine Physics/Radiation Biophysics  
(F)(3-0-3)  

NMT 215 Radiochemistry and Radiopharmacy  
(W)(3-3-4)  
The design and function of radionuclide generators, labeling procedures, sterility and pyrogenicity considerations, radionuclide and radiochemical quality control procedures. Prerequisite: CHE 350 with grade “C” or better.

NMT 217 Patient Care  
(F)(3-3-4)  
Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the nuclear medicine technologist in patient education. Prerequisite: MIT 103.

NMT 225 Nuclear Physics/Instrumentation  
(S)(3-3-4)  
An in-depth examination of the physics in nuclear medicine, principles of detection, considerations of counting and imaging, collimators, planar imaging and associated quality assurance and control. Use of all major instrumentation in Nuclear Medicine Departments. Prerequisite: NMT 215 with grade “C” or better.

NMT 256 Cardiovascular Imaging  
(S)(3-0-3)  
Introduction to Cardiovascular Imaging techniques in Nuclear Medicine including planar, SPECT, and PET imaging acquisition and processing protocols, radiopharmacetics, cardiac anatomy and physiology, exercise and pharmacological stress testing, and EKG principles. Prerequisites: NMT 205, NMT 215, NMT 217.

NMT 311 Imaging Procedures I  
(F)(3-3-4)  
Proper patient care before, during and after the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body organ imaging. Prerequisite: NMT 225 with grade “C” or better.

NMT 312 Imaging Procedures II  
(W)(3-3-4)  
Proper patient care before, during and after
the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body and organ imaging.
Prerequisite: NMT 225 with grade “C” or better.

NMT 313 Therapeutic Procedures
(S)(3-0-3)
Common therapeutic applications of radionuclides, dose ranges for each application, and proper techniques for calculating quantities of administered radiopharmaceuticals. Includes patient care, follow-up procedures and disposal of excreta.
Prerequisite: NMT 312 with grade “C” or better.

NMT 325 SPECT Imaging and Computer Applications
(S)(3-3-4)
Single photon emission computed tomography (SPECT) imaging and computing applications as applied to nuclear medicine imaging. Demonstration of computer techniques and ECG monitoring and interpretation. Theoretic basis of computer operations and medical applications in nuclear medicine. Lab experience with computerized systems, including hospital sites.
Prerequisites: BIO 335 and NMT 312 with grade “C” or better.

NMT 346 Magnetic Resonance
(F)(3-3-4)
Physics and principles used in the production of magnetic resonance images and spectroscopy. Static magnetic fields, gradient magnetic fields, secondary coil fields, nuclear magnetic resonance (NMR), spatial frequency domain, frequency domain, computer data acquisition, relaxation times, pulse sequence diagrams. Laboratory simulation is included.
Prerequisites: NMT 225 and PHY 217 (or equivalent) with grade “C” or better.

NMT 355 Computed Tomography
(W)(3-3-4)
X-ray physics, scanner components and data acquisition of computed tomography. Image reconstruction, manipulation and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis and musculoskeletal system. Laboratory simulator practice on image manipulation, scan post processing and reconstruction.
Prerequisite: NMT 311 with grade “C” or better.
Corequisites: NMT 367, BIO 335.

NMT 367 PET Imaging
(F)(3-0-3)
Introduction to Position Emission Tomography (PET) imaging techniques including acquisition protocols, processing protocols, quality control procedures, radiation protection, patient screening, radiopharmaceuticals, image fusion, and imaging procedures.
Prerequisite: NMT 225 with grade “C” or better.
Corequisites: NMT 311 and NMT 346.

NMT 388 Externship Preparation
(S)(3-0-3)
Review and summarize key concepts in Nuclear Medicine. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment. Review and discussion of the NMT Externship Handbook and Procedures Log.
Prerequisites: Third quarter junior level status is required for this course.

NMT 410 Nuclear Medicine Technology Externship
(F,W,S)(0-40-15)
All students must complete four consecutive terms (12 months) of clinical experience in nuclear medicine technology at an Oregon Tech approved site. Students will work under the direct supervision of a registered Nuclear Medicine Technologist.
Prerequisite: All NMT courses with grade “C” or better.

NMT 445 Computed Tomography Clinical Experience
(F,W,S)(0-15-5)
All students must complete three consecutive terms (9 months) of clinical experience in computed tomography at a hospital or clinic of their choosing. Students will work under the direct supervision of an ARRT (CT) board registered technologist.
Prerequisite: ARRT and/or NMTCB registry in Nuclear Medicine Technology. Successful completion and faculty approval of Computed Tomography and Cross Sectional anatomy course.

(PhED) Physical Education

PHED 100 Belly Dance: Beginning
(F,W,S)(0-3-1)
Experience an unique dance form. Students will learn basic hip, rib, and shoulder isolations and of course shimmys. All of this and more are done in combinations, and finally a choreographed dance.

PHED 101 Belly Dance: Intermediate
(W,S)(0-3-1)
A continuation of the beginning class. More complex moves are introduced and more technical expertise is expected. Dancing with veils will be introduced. There will be more complex choreography and music. Dance experience is helpful.

PHED 102 Zumba
(F,W,S)(0-3-1)
Zumba is an exhilarating, effective, easy to follow, Latin inspired, calorie burning dance fitness party. Zumba classes feature exotic rhythms set to high energy Latin and international beats.

PHED 107, PHED 307, PHED 407 Seminar
(Hours to be arranged each term.)

PHED 110 Boot Camp/Kick Boxing
(F)(0-3-1)
This is a high-low workout with an emphasis on kickboxing (both Taeko and Turbo kickboxing), also included is body pump workouts, core ball as well as Winsor Pilates stretching.

PHED 111 Core Strength and Balance
(W,S)(0-3-1)
BOSU ball training to improve balance and core strength and alleviate back pain and instability. This class includes full body training, using floor work, cardio circuits, and isometric exercises.

PHED 112 Intro to Cardio and Core
(S)(0-3-1)
A survey participation of cardiovascular group exercise using cardio kickboxing (including both Taeko and Turbo kickboxing), dance aerobics, and step aerobics.

PHED 113 Super Circuit and Cardio Training
(F,W,S)(0-3-1)
This course is designed to use a combination of free weights and/or the universal machines, along with cardiovascular fitness to provide a comprehensive program to increase muscle strength and endurance.
Courses with the following notation fulfill the appropriate general education requirements:

- C - Communication
- H - Humanities
- HP - Humanities Performance
- SS - Social Science

For more information, see page 31
PHED 146 Yoga  
(F,W,S)(0-3-1)  
Class is generally Hatha Yoga, along with basic Ashtanga, and Kundalini Yoga techniques. In yoga a participant can hope to improve their flexibility, strength and balance.

PHED 150 Aikido  
(F)(0-3-1)  
A Japanese martial art reflecting the circular movements and energy transference found throughout the universe. Provides the necessary skills to train for practical and tough self-defense while building self-confidence, character, self-respect, and respect for others.

PHED 151 Karate  
(F,W)(0-3-1)  
Dive into the very heart and soul of Karate! Teachings in traditional forms, self-defense, and competitive style point sparring. Great for new and experienced students. Promotes physical activity, increased mobility, and awareness while learning a valuable life skill.

PHED 160 Cross Country Skiing: Beginning   
(W)(0-3-1)  
Explore clothing, equipment and learn to travel on cross country skis while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide experience to use for a lifetime.

PHED 161 Snowshoeing: Beginning  
(W)(0-3-1)  
Explore clothing, equipment and learn to snowshoe while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide an enjoyable and learning recreational experience to use for a lifetime.

PHED 162 Ice Skating  
(W)(0-3-1)  
Covers basic figure skating technique using U.S. Figure Skating adult teaching guidelines, levels 1 through 4. Skills include proper use of forward and backward edges, basic curves and turns, simple spins and integrated use of upper body and arm movements.

PHED 163 Wilderness Navigation  
(S)(0-3-1)  
Learn to read a map and utilize a compass. Gain skill to find precise wilderness locations. Learn the dangers of wilderness travel, and deal with those situations. Two field trips polish skills using map and compass to navigate.

PHED 170 Golf  
(S)(0-3-1)  
Lecture covers terminology, rules, etiquette, and course management. Practical class will cover putting, chipping, and driving.

PHED 171 Archery: Beginning  
(S)(0-3-1)  
Students learn basics of shooting a bow & arrow. Safety, form, mechanics, and basic skills. Classes meet off-campus. No prior experience required.

PHED 172 Archery: Intermediate  
(S)(0-3-1)  
Build upon basic skills learned in Beginning Archery. Advanced instruction in shooting, mechanics, and basic repairs offered. Classes meet off-campus. Prerequisite: PHED 171.

PHED 174 Recreational Basketball  
(F,W,S)(0-3-1)  
Basketball game played in a recreational environment. Emphasis on free play and team skill development. Most suitable for players with basic basketball skills.

PHED 175 Rugby  
(F,W,S)(0-3-1)  
Basic rugby skill, practice, and game play. Players of any skill level welcome. Participants should be able to engage in physical contact, strength development, endurance training, team practice, and game play.

PHED 180 Varsity Cross Country  
(F,W,S)(0-3-1)  
Competitive Cross Country for multi-level distance runners. Trail running, conditioning, strength training, psychological peak performance, nutrition, race tactics, running physiology and injury prevention is included. Participation in intercollegiate competition is included. Varsity athletes only or coaches approval.

PHED 181 Varsity Soccer  
(F,W,S)(0-3-1)  
Competitive Soccer at the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coaches approval.

PHED 182 Varsity Track/Field  
(F,W,S)(0-3-1)  
Competitive Track and Field techniques are covered including training, conditioning and team organization. Competition at the intercollegiate level. Varsity athletes only or coaches approval.

PHED 183 Varsity Men’s Baseball  
(F,W,S)(0-3-1)  
Competitive Baseball on the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coaches approval.

PHED 184 Varsity Men’s Basketball  
(F,W,S)(0-3-1)  
Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

PHED 185 Varsity Women’s Basketball  
(F,W,S)(0-3-1)  
Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

PHED 186 Varsity Women’s Softball  
(F,W,S)(0-3-1)  
Competitive Softball including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

PHED 187 Varsity Women’s Volleyball  
(F,W,S)(0-3-1)  
Competitive Volleyball at the intercollegiate level including advanced technique analysis, offensive and defensive strategies, training, conditioning, and team organization. Varsity athletes only or coaches approval.

PHED 188 Varsity Sport Strength/Conditioning  
(F,W,S)(0-3-1)  
This course provides instruction for sports specific conditioning for varsity athletes. This includes strength training, power training, speed and agility training, core training, dynamic flexibility, and specific energy system.
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

PHED 190 Physical Education (F,W,S)(0-3-1)
Service course. General participation in physical activities to promote sound health.

PHED 201 Sports Seminar - Officiating (S)(1-3-2)
This course includes rules, mechanics and officiating procedures in sports found in intercollegiate, interscholastic, and intramural programs. Practical experience in officiating will be provided.

PHED 207 Major Sports Seminar (F,W,S)(1-2-2)
Development of professional competencies in fundamentals of training methods and objectives of major sports.

PHED 255 Introduction to Coaching Theory (S)(3-0-3)
An introduction to the central principles of coaching. Exploration of coaching as a practice including theories of coaching, motivation, and organization.

PHED 291 Lifeguard Training (S)(1-2-2)
Basic skills of lifesaving in aquatic programs; American Red Cross Advanced Lifesaving Authorization.

PHED 292 Water Safety Instructor (S)(1-2-2)
Analysis, methods of instruction, and teaching of aquatic skills; American Red Cross Authorization in Water Safety Instruction.

PHED 355 Coaching in Application (S)(3-0-3)
Application of the principles of coaching. Application of the theories of coaching across contexts and in various different sports.
Pre-requisite: PHED 255

PHED 455 Coaching Practicum (S)(0-6-3)
Practical application of coaching theories and methods in context. 60 hours of directed coaching experience.
Pre-requisite: PHED 355

PHIL 105 Introduction to Ethics. (F)(3-0-3) H
Students will become familiar with Kant's moral theory and Utilitarianism and use them to examine the morality of abortion, factory farming, and famine relief, among others. Students will learn how to make rational moral judgments.
Pre-requisite: WRI 122 or WRI 227

PHIL 107, PHIL 207, PHIL 307, PHIL 407 Seminar (Hours to be arranged each term.) H

PHIL 205 Introduction to Logic. (F,W,S)(3-0-3) H
This course prepares students to critique and assess arguments according to the rules of logic. Students will learn formal and informal methods for assessing deductive, inductive, abductive arguments. Logic is useful for all majors because everything you learn at OIT is based on arguments.

PHIL 215 Ethical Theory (W)(3-0-3) H
Pre-requisite: WRI 122 or WRI 227

PHIL 305 Medical Ethics (F)(3-0-3) H
Students will become familiar with Kant's moral theory and Utilitarianism and use them to examine the morality of abortion, paternalism, allocation of medical resources, and the right to die, among others. Students will learn how to make rational moral judgments.
Pre-requisites: WRI 122 and junior standing.

PHIL 315 The Ethics of Emerging Technology. (F)(3-0-3) H
In this course we will become familiar with genetic engineering, geoengineering and cognitive enhancement and examine the moral status of each. This course will provide you with the critical thinking skills to make rational ethical decisions concerning emerging technologies.
Pre-requisite: WRI 122 or WRI 227

PHIL 325 Environmental Ethics. (S)(3-0-3) H
Students will become familiar with influential moral theories, including those of Kant and Aristotle and Utilitarianism. Possible topics include: What is nature? Do we have a moral obligation to restore ecosystems? If we have moral obligations to nature, on what grounds?
Pre-requisite: WRI 122 or WRI 227

PHIL 331 Ethics in the Professions (F,W,S)(3-0-3) H
Applied ethics course that focuses on examining ethical issues common to the professions, such as privacy, confidentiality, social responsibility and whistle-blowing. Emphasizes critical thinking and ethical decision-making skills.
Pre-requisite: WRI 123 or WRI 227.

PHIL 335 Philosophy of Science. (W)(3-0-3) H
What is the difference between science and pseudoscience? What is a scientific explanation? What is a law of nature? Is science objective or value-laden? In this course, students will engage with these and other fundamental topics in philosophy of science.
Pre-requisite: WRI 122 or WRI 227

PHIL 342 Business Ethics (F,W,S)(3-0-3) H
Business ethics course that focuses on ethical issues commonly found in business, such as whistle-blowing, discrimination, finance and international manufacturing. Emphasizes critical thinking, critical reading and the importance of personal ethics.
Pre-requisites: One previous Humanities course and WRI 122.

PHIL 405 Advanced Logic. (W)(3-0-3) H
This course will build off the foundation of PHIL 205. Students will deepen their understanding of sentential logic and will learn about predicate logic. We will also prove that both formal systems are sound and complete.
Pre-requisite: PHIL 205.

PHYS 107, PHYS 207, PHYS 307, PHYS 407 Seminar (Hours to be arranged each term.)

PHYS 201 General Physics (F)(3-3-4)
Courses with the following notation fulfill the appropriate general education requirements:

<table>
<thead>
<tr>
<th>prefix</th>
<th>name</th>
<th>description</th>
</tr>
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<tbody>
<tr>
<td>C</td>
<td>Communication</td>
<td>An introduction to physics with study of Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section. Prerequisite: MATH 112 with grade “C” or better.</td>
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<tr>
<td>HP</td>
<td>Humanities Performance</td>
<td>PHY 202 General Physics (W)(3-3-4) Temperature systems, heat, kinetic theory of gases, introductory thermodynamics, and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section. Prerequisite: PHY 201.</td>
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<tr>
<td>SS</td>
<td>Social Science</td>
<td>PHY 203 General Physics (S)(3-3-4) Wave motion, sound, introduction to geometrical and physical optics, and topics from modern physics. All general physics students must register for a laboratory section. Prerequisite: PHY 202.</td>
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<td>PHY 215 Topics in Astronomy (F)(2-3-3) Astronomy including a survey of the solar system, constellations, star characteristics, star groupings, galactic and extragalactic objects, stellar evolution, and instrumentation with emphasis on topics of maximum interest to the students. Prerequisite: MATH 111.</td>
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<td>PHY 217 Physics of Medical Imaging (ES)(3-0-3) An introduction to physics for MIT majors. Topics include: basic mechanics, basic electrostatics, fundamentals of electronics, magnetism, sources and types of radiation, and image formation. Prerequisite: MATH 112 with grade “C” or better.</td>
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<td>PHY 221 General Physics with Calculus (FW)(3-3-4) Basic principles of physics with emphasis on applications of calculus. Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section. Prerequisite: MATH 251 with grade “C” or better. Corequisite: MATH 252.</td>
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<td>PHY 222 General Physics with Calculus (W,S)(3-3-4) Temperature systems, heat, kinetic theory of gases, thermodynamics and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section. Prerequisites: MATH 252, PHY 221.</td>
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<tr>
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<td>PHY 223 General Physics with Calculus (F,S)(3-3-4) Wave motion, sound, introduction to geometrical and physical optics, and selected topics from modern physics. All general physics students must register for a laboratory section. Prerequisite: PHY 222.</td>
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<td>PHY 237 Meteorology (2-3-3) Principles of atmospheric structure and movement; horizontal and vertical motions; air masses; micrometeorology; atmospheric diffusion in relation to air pollution. Prerequisite: PHY 202 or PHY 222.</td>
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<td>PHY 305 Nanoscience and Nanotechnology (F)(4-0-4) Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials. Prerequisites: PHY222 or PHY223, and CHE202 or CHE222.</td>
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<td>PHY 311, PHY 312, PHY 313 Introduction to Modern Physics (3-0-3) An introduction to physics of the 20th century, including selected topics from atomic and nuclear physics and quantum theory with applications in science and industry. Prerequisite: PHY 203 or PHY 223.</td>
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<tr>
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<td>PHY 330 Electricity and Magnetism (W)(3-0-3) A study of electromagnetic phenomena leading to and using Maxwell’s equations. Topics will include static fields in vacuum and in dielectric media, electric and magnetic potentials, and the energy density of electromagnetic fields. Prerequisites: MATH 254N, PHY 222.</td>
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<td>PHY 410 Mathematical Methods: Fourier Optics (W)(3-0-3) Linear systems, Fourier transforms, and their use in optics. Topics will include special functions, orthogonal expansions, Fourier series and transforms and spectra of functions, mathematical operators, convolution, auto-correlation, cross correlation, linear systems as filters, and signal processing. Prerequisite: MATH 254N.</td>
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<td>PHY 448 Geometric Optics (W)(3-3-4) Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations. Prerequisite: PHY 223.</td>
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<td>PHY 449 Radiometry &amp; Optical Detection (F)(3-3-4) Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive,photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry. Prerequisite: PHY 223, EE 223.</td>
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<td>PHY 450 Physical Optics (S)(3-3-4) Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography. Prerequisite: PHY 223.</td>
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<td>PHY 451 Lasers (F)(3-3-4) Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers. Prerequisites: EE 450 or PHY 450.</td>
</tr>
</tbody>
</table>
|       |                                 | PHY 452 Waveguides and Fiber Optics (W)(3-3-4) Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time
domain reflectometry, fiber amplifiers, and fiber sensors.
Prerequisites: EE 450 or PHY 450

**PHY 453 Optical Metrology**
(S)(3-3-4)
Modern optical metrology with emphasis on non-destructive testing: Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.
Prerequisites: EE 450 or PHY 450

**PHY 454 Geometric Optics**
(F)(3-3-4)
Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.
Prerequisite: PHY 223

**PHY 458 Radiometry & Optical Detection**
(W)(3-3-4)
Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.
Prerequisite: PHY 223

**PHY 459 Physical Optics**
(S)(3-3-4)
Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.
Prerequisite: PHY 223

**PHY 460 Lasers**
(F)(3-3-4)
Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.
Prerequisites: EE/PHY 450 or EE/PHY 550

**PHY 462 Waveguides and Fiber Optics**
(W)(3-3-4)
Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.
Prerequisites: EE/PHY 450 or EE/PHY 550

**PHY 553 Optical Metrology**
(S)(3-3-4)
Modern optical metrology with emphasis on non-destructive testing: Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.
Prerequisites: EE/PHY 450 or EE/PHY 550

**PSG 211 Fundamentals of PSG and Patient Care**
(E,W,S)(3-0-3)
Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing universal precautions. Role of the polysomnographic technologist in patient education. Ethical and legal issues.

**PSG 221 Physiology of Sleep**
(E,W,S)(3-0-3)
Introduction to sleep architecture and the function of changes in electroencephalograms, electrocardiograms, and electromyograms. Physiology of sleep-induced alterations in pharyngeal muscle tone, autonomic control and polysomnographic staging.

**PSG 231 Sleep Disorders Pathology**
(W)(4-0-4)
Normal and abnormal sleep disorders integrating the physiological functions of the nervous, respiratory, and cardiovascular systems. Emphasis on basic sleep sciences, physiology, diagnosis and treatment of sleep disorders.
Prerequisite: PSG 221.

**PSG 246 Sleep Disorders in Women**
(W)(3-0-3)
In-depth study of sleep disorders in women exploring: the menstrual cycle; circadian rhythms and shiftworking women; polycystic ovary syndrome; endometriosis, fibromyalgia; breast cancer and fatigue; pregnancy and sleep-disordered breathing; insomnia and other medically related sleep disturbances.

**PSG 264 Pediatric/Neonatal Polysomnography**
(E,S)(4-0-4)
Presentation of theory and its practical applications in pediatric and neonatal respiratory diseases and other sleep disorders. Includes pathophysiology, etiology, patient testing, scoring and treatment.
Prerequisite: PSG 221 or RPSGT licensed.

**PSG 271A Clinical Polysomnographic Technology Part A**
(E,S)(2-12-6)
Medical terminology, instrumentation setup and calibration, 10/20 system, patient hook-ups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 nighttime clinical hours weekly.
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication   H - Humanities   HP - Humanities Performance   SS - Social Science

For more information, see page 31
PSY 312 Human Growth and Development II
(W,S)(3-0-3) SS
The psychological study of the continuing development of the human being from adolescence through old age and death. Discusses the biological, psychological, and social processes relevant to this developmental time span. Applications to health care, family, community and education are discussed. Prerequisite: PSY 201, 202 or 203

PSY 313 Psychological Research Methods I
(F,S)(3-3-4) SS
Overview of the techniques of research in psychology. Emphasis is placed on techniques of quantitative research, including experimental, quasi-experimental, field, and survey research methods. Students are engaged in developing an APA research proposal based on current psychological literature. Prerequisites: PSY 203 and one of the following: PSY 225, MATH 243 or MATH 361, with a "C" or better.

PSY 314 Psychological Research Methods II
(W)(3-3-4) SS
An in-depth look at advanced research methodology, including complex research design. Students gain experience with research projects by collecting data, analyzing, writing an APA style manuscript, and presenting a conference-style poster. Prerequisite: PSY 313.

PSY 317 Field and Career Preparation
(F,W,S)(3-0-3) SS
Exploration of careers related to the field of psychology. Processes and skills needed for career search and placement,Externship process and opportunities will be discussed.

PSY 321 Theories of Personality I
(F)(3-0-3)
In-depth coverage of personality theorists/theories, such as Freud, Adler, Horney, Eriksen, and the Five Factor Theory. Applications of various theoretical concepts to case studies and to people in their personal lives. Prerequisite: PSY 201, 202, or 203

PSY 322 Theories of Personality II
(W)(3-0-3) SS
In-depth coverage of personality theorists/theories such as Maslow, Skinner, Rogers, Bandura, Sociological, and Cultural. Applications of various theoretical concepts to case studies and to people in their personal lives. Prerequisite: PSY 201, 202 or PSY 203.

PSY 330 Social Psychology I
(F,W)(3-0-3) SS
Surveys behavior and experience in a social context. Topics include the self in the social world, attribution, social cognition, affiliation and romantic relationships. Theory, research and application discussed. Prerequisite: PSY 201 or PSY 203.

PSY 331 Social Psychology II
(W,S)(3-0-3) SS
Surveys behavior and experience in a social context. Topics include social influence, attitudes and persuasion, aggression, group dynamics, altruism and stereotyping/prejudice/discrimination. Theory, research and application discussed. Prerequisite: PSY 201 or PSY 203.

PSY 334 Behavior Modification I
(F)(3-3-4) SS
Measurement of behavior and key concepts of operant learning are covered, e.g., reinforcement, extinction, punishment, stimulus control and shaping, among others. Laboratory exercises are interactive computer simulations of these concepts. First in five course sequence approved by The Behavior Analyst Certification Board, Inc. as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination*. Applicants will have to meet additional requirements to qualify. Prerequisite: PSY 203

PSY 335 Behavior Modification II
(W)(3-3-4) SS
Principles learned in PSY 334 are applied to the study of human behavior. Complex techniques and new learning concepts found in the “real world” are also covered. Treatment plans for actual human problem behaviors are created in the laboratory. Second in five course sequence approved by The Behavior Analyst Certification Board, Inc. as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination*. Applicants will have to meet additional requirements to qualify. Prerequisite: PSY 334

PSY 336 Health Psychology I
(F)(3-0-3) SS
The application of psychological theories to the understanding of the relationship between health, the environment, and behavior. This course focuses on the mind-body connection, stress, realities of healthcare delivery, health behavior change models, and research methods in health psychology. Prerequisite: PSY 202 or instructor approval.

PSY 337 Health Psychology II
(W)(3-0-3) SS
The application of psychological theories to understand relationships between health, the environment, and behavior. Focuses on prevention of disease/negative health behaviors, and promotion of health and well-being. Topics include substance abuse, nutrition, exercise, chronic illness, sex, and the built environment. Prerequisite: PSY 336.

PSY 339 Biopsychology
(F,W)(3-0-3) SS
Anatomical and physiological basis of behavior patterns presented from genetic, developmental, evolutionary and functional evidence. Discussions of mind-body relationships, senses, sleep, motor activity, emotions, and reproduction. Prerequisite: PSY 202 or BIO 232 or instructor consent.

PSY 341 Psychoactive Drugs I: Psychiatric Drugs
(W)(3-0-3) SS
Students will investigate the physiological, behavioral, social, and societal aspects of psychiatric drugs, including anti-anxiety, anti-depressant, and anti-psychotic drugs. Prerequisite: PSY 202
Pre- or corequisite: PSY 216

PSY 342 Psychoactive Drugs II: Abused Drugs
(S)(3-0-3) SS
Students will investigate the physiological, behavioral, social, and societal effects of abused drugs including alcohol, hallucinogens, marijuana, opiates, and stimulants. Prerequisite: PSY 341 or PSY 202 and instructor approval.

PSY 345, Educational Psychology I
(W,S)(3-0-3) SS
Introduction to psychological concepts, theories, and methodologies as applied to education. Focus will be on...
Courses with the following notation fulfill the appropriate general education requirements:

- Humanities: CH
- Humanities Performance: HP
- Social Science: SS

the major psychological views of learning and how these can be applied to create effective strategies and environments for teaching and learning. Prerequisite: PSY 201, 202 or 203.

PSY 346, Educational Psychology II
(S)(3-0-3) SS
Exploration of psychological principles and theories of teaching and learning. Focus will be on learner motivation, differences, needs, culture, and diversity. How to shape supportive learning environments and form comprehensive teaching will be considered, as will assessment of learning. Prerequisite: PSY 201, 202 or 203.

PSY 347 Organizational Behavior
(F,S,W)(3-0-3) SS
Psychology applied to business organization and operations as they affect employees, customers, and the community with particular interest on group processes. Prerequisite: Junior standing or instructor consent.

PSY 351 Cognitive Restructuring I
(W)(3-3-4) SS
Philosophy behind criminal thinking errors, which influence their thought patterns. Laboratory component includes participation in client groups and casework. Prerequisite: PSY 301 or PSY 334.

PSY 355 Evolutionary Psychology
(S)(3-0-3) SS
Examination of biological determinants underlying human behavior. Discusses family relations, aggression, crime, mating and other social aspects with regard to adaptation and fitness. Prerequisite: BIO 103, or BIO 213, or PSY 203, or instructor consent.

PSY 356 Military Psychology
(Su)(3-0-3) SS
Examination of the mental health and environmental issues facing current and former service members and Their families by exploring military culture, theory, assessment, and evidence based interventions. Prerequisite: PSY 201, 202, or 203.

PSY 358 Psychology of Gender
(S)(3-0-3) SS
Psychological examination of the functioning, specialization, self-concept, and roles of women and men. Issues that women and men face in the gendered world are critically analyzed scientifically and experientially. Prerequisite: PSY 201, PSY 202, or PSY 203.

PSY 360 Organizational Psychology
(F)(3-0-3) SS
Psychology applied to human relations problems in the work world. Specific topics include job satisfaction, motivation, leadership, attitudes and effects of stress on employees and job performance. Prerequisite: PSY 201.

PSY 361 Industrial Psychology
(W)(3-0-3) SS
Application of psychological principles, theories and behavioral techniques applied to human relations, problems in industrial situations. Prerequisite: PSY 201, PSY 202 or PSY 203.

PSY 364 Environmental Psychology
(S)(3-0-3) SS
An interdisciplinary look into the human-environment interaction in regards to sustainability, conservation, and the natural and built environments. Students will apply psychological theory to understand the role of human behavior, attitudes, policy, and ethics in sustainability and conservation efforts. Prerequisite: PSY 201.

PSY 365 Human Sexuality I
(W)(3-0-3) SS
Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: theory and research, gender, anatomy and functioning, and human relationship components, including love and communication. Prerequisite: PSY 201, PSY 202, or PSY 203.

PSY 367 Human Sexuality II
(S)(3-0-3) SS
Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: sexual orientation, pregnancy, contraceptive practices, sexual dysfunctions, sexually transmitted infections, paraphilias, sexual assault, media images, the sale of sex. Pre- or corequisite: PSY 371.

PSY 375 Organizational Behavior Management
(S)(3-0-3) SS
Introduction to research and practice in Organizational Behavior Management (OBM). Topics include performance management, behavioral systems analysis, process mapping, scientific research in organizational change, and career options for organizational consultants. Prerequisite: PSY 201.

PSY 376 Foundations of Sport Psychology
(Su)(3-0-3) SS
Introduction to the foundations of psychology in the sport and physical activity domain. Focus will be on current theories, empirical research, and practices in the field of sport and exercise psychology. Prerequisite: PSY 201, 202, or 203.

PSY 401 Advanced Counseling Techniques
(W)(3-0-3) SS
Major schools of psychotherapy are discussed. Students practice related techniques in the laboratory following demonstration and instruction. Group therapy techniques are emphasized with associated laboratory work using interactive CDROM, group therapy videotapes, and a Web site corresponding to readings. Prerequisite: PSY 301.

PSY 410 Organizational Change and Development
(F,W,S)(3-0-3) SS
Theories and processes necessary to understand and implement change within organizations. Focuses on impact of technological change in organizations and on skill development in planning, implementing and evaluating change.

PSY 416 Abnormal Behavior of Children and Adolescents
(S)(3-0-3) SS
Highlights differences between children and adults in their expression of emotional and interpersonal problems. Language/learning disabilities, problems of attention deficit, school refusal and separation anxiety, depression, and eating. Description of symptoms and treatments are emphasized. Prerequisites: PSY 215, PSY 216, PSY 311, PSY 312.

PSY 420 Applied Psychology Externship
(F,W,Su)(4, 8, 12 or 16 credit hours) SS
Opportunities to work under supervision in applied settings related to students’ career interests. Students apply the knowledge they
acquired in their classes and gain experience working in the field. 
Prerequisites: PSY 301 with grade “C” or better and PSY 317 with grade “B” or better. Approval of the externship coordinator and completion of at least 120 hours of college credit.

**PSY 421 Senior Project I**
(F)(1-6-3) SS
First term of a three-term comprehensive project in applied psychology. Focus on refining a research project, literature review and formulation of research question. Pre requisite: PSY 313.

**PSY 422 Senior Project II**
(W)(1-6-3) SS
Second term of a three-term comprehensive project in applied psychology. Focus on development of research methodology and pilot testing of project. Pre requisite: PSY 421.

**PSY 423 Senior Project III**
(S)(1-6-3) SS
Third term of a three-term comprehensive project in applied psychology. Focus on data collection, writing of research report and oral presentation of project. Pre requisite: PSY 422.

**PSY 425 Motivational Interviewing**
(F)(3-0-3) SS
Motivational interviewing is a highly effective (evidence based) approach to enhance behavior change in psychotherapy, substance abuse counseling, dentistry, education, various medical professions and business. This course will overview the theory, process, skills and implementation of motivational interviewing. Pre requisite: PSY 301 or instructor consent.

**PSY 428 Animal Behavior**
(S)(3-0-3) SS
The biological foundations of animal behavior are presented from an ethological and comparative psychology perspective. Emphasizes the evolution, development, and physiological basis of behavior patterns and presents topics on learning, perception, orientation, communication, and social behavior. (Cannot be taken for graduation credit by students who have taken BIO 428.) Pre requisite: PSY 202 or BIO 213.

**PSY 431 Family Therapy**
(3-0-3) SS
Basic differences between functional and dysfunctional families. Theoretical underpinnings of family therapy, an emphasis on particular theoretical models, different family populations including single parent families, blended families and culturally diverse families. Pre requisite: PSY 301.

**PSY 432 Group Therapy**
(3-3-4) SS
Theory and application of group therapy techniques. Historical and current applications of group treatment, special populations and multicultural considerations. Pre requisite: PSY 301.

**PSY 434 Advanced Behavior Modification I**
(W)(4-0-4) SS
Ethical principles and issues in Applied Behavior Analysis and behavioral assessment methods and techniques, including measuring behavior and analyzing data. Third in five course sequence approved by The Behavior Analyst Certification Board, Inc. as meeting the coursework requirements for eligibility to take the Board Certified Behavior Analyst Examination*. Applicants will have to meet additional requirements to qualify. Pre requisite: PSY 313.
Pre- or corequisite: PSY 335.

**PSY 435 Advanced Behavior Modification II**
(S)(4-0-4) SS
Application of principles and techniques of Applied Behavior Analysis to change behavior. Fourth in five course sequence approved by The Behavior Analyst Certification Board, Inc. as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination*. Applicants will have to meet additional requirements to qualify. Pre requisite: PSY 434.

**PSY 441 Youth Mentorship I**
(F)(2-3-3) SS
Applied learning experience working with youth. Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit. Pre requisite: Instructor approval required

**PSY 442 Youth Mentorship II**
(W)(2-3-3) SS
Applied learning experience working with youth; continuation from PSY 441. Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit. Pre requisite: PSY 441 and Instructor approval required

**PSY 443 Youth Mentorship III**
(S)(2-3-3) SS
Applied learning experience working with youth; continuation from PSY 442. Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit. Pre requisite: PSY 442 and Instructor approval required

**PSY 445 Oregon Tech Relationship Building Program**
(F.W.S)(variable 1-3) SS
This course will provide an orientation to and ongoing training for family mentors in the Oregon Tech Relationship Building Program. Program related projects will be assigned based on number of credits (1-3) selected. This course can be repeated for credit. Pre requisite: PSY 301 or instructor permission.

**PSY 446 Psychological Trauma**
(F)(3-0-3) SS
Explores and introduces student to psychologically traumatic experiences in terms of definition, impact and reactions, including assessment and treatment of trauma-related psychological problems. Special focus on post-traumatic stress disorder. Pre requisite: PSY 301.

**PSY 455 Cognitive Psychology**
(F)(3-0-3) SS
The scientific study of mental process and how the mind works (or fails to work). Topics include memory, knowing, decision-making, attention, morality, and theories of mind. Students will debate current topics in the field and learn practical applications for cognitive research. Pre requisite: PSY 201

**PSY 456 Performance Management**
(S)(3-0-3) SS
Application of principles and techniques of Applied Behavior Analysis to change behavior, focus on implementation, management, and supervision of behavior change programs and systems in business, industry, and human services. Fifth in five course sequence ap-
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C - Communication  
H - Humanities  
HP - Humanities Performance  
SS - Social Science  

proved by The Behavior Analyst Certification Board, Inc.” as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination”. Applicants will have to meet additional requirements to qualify.  
Prerequisite: PSY 434

**PSY 475 Capstone in Applied Psychology**  
(F,W,S)
(SS): (3-0-3) SS  
Provides students the opportunity to synthesize material learned throughout the degree program, create innovative projects, and evaluate new ideas related to higher level topics in applied psychology. Topics vary by term. May be repeated for credit.  
Prerequisite: Senior standing or instructor approval

**PSY 480 Theories of Learning**  
(S): (4-0-4) SS  
The basics of the major learning theories as they apply to operant and respondent conditioning, social learning, and memory.  
Prerequisite: PSY 335.

**PSY 485, Education Assistantship**  
(F,W,S): (3-0-3) SS  
Hands on exploration of educational functions with a wide range of possible ages and abilities; will involve tutoring and mentoring with additional specific duties dependent on the goals of each student. May be repeated for credit.  
Prerequisite: Requires Instructor Approval

**PSY 497 Special Projects/Training**  
(F,W,S): (Variable Credit 1 - 6) SS  
Students may enroll for credit in special programs offered by external agencies, approved by the department, leading to the development of specialized skills. Programs may include training to work with special populations. May be taken twice for credit.  
Prerequisite: Senior standing in Applied Psychology and permission of HSS department chair.

**PSY 499 Independent Study**  
(Variable Credit 1-6) SS  
Intensive self-study of a topic in psychology of the student’s choosing. Study guided by any professor in the Applied Psychology program. May be repeated, with different topics, up to three times.  
Prerequisite: Senior standing in Applied Psychology and permission of HSS department chair.

**PSY 500 Life Span Development**  
(F): (3-0-3) SS  
Study of principles of human development with emphasis on the contributions of biological, social, psychological, and multicultural influences as applied to an understanding of cognitive, emotional, social, and physical development across the lifespan.  
Prerequisite: PSY 434

**PSY 505 Law, Ethics & Professional Development**  
(F): (3-0-3) SS  
Examines all aspects of therapy that involve statutes, regulations, principles, values and ethics of Marriage and Family Therapists with a special emphasis on the legal and ethical considerations of marriage and family therapy.  
Prerequisite: PSY 434

**PSY 512 Systems Theory**  
(W): (3-0-3) SS  
In-depth analysis of Systems Theory in family dynamics. Emphasis placed on structural, strategic, and solution focused applications to counseling.  
Prerequisite: PSY 505

**PSY 513 Couples Theory**  
(S): (3-0-3) SS  
Overview of the fundamental theoretical foundations of couples therapy, including systemic, communication, interactional theories of behavior as it relates to couples.  
Prerequisite: PSY 512

**PSY 521 Individual Counseling Techniques**  
(S): (3-0-3) SS  
Evidence-based counseling interventions including theory and application from the primary schools of psychotherapy including cognitive-behavioral, systems theory, and humanistic.  
Prerequisite: PSY 505

**PSY 522 Individual Counseling Techniques II**  
(F): (3-0-3) SS  
Advanced evidence-based counseling interventions including application of interventions from the primary schools of psychotherapy including cognitive-behavioral, systems theory, and humanistic.  
Prerequisite: PSY 521

**PSY 525 Family Therapy I**  
(F): (3-0-3) SS  
Examines theories and techniques of family therapy including various models of family therapy. This course will offer opportunities for practice of the techniques through role playing and review of therapy sessions.  
Prerequisite: PSY 512

**PSY 526 Couples Therapy**  
(F): (3-0-3) SS  
Examines issues related to therapeutic theories and treatment strategies with couples, including marriage, partnership, divorce, parenting and remarriage.  
Prerequisite: PSY 513

**PSY 530 Research Methods**  
(W): (3-0-3) SS  
Fundamentals of methods for conducting research including experimental designs and non-experimental designs. Includes program evaluation, clinical studies, ethics, and statistical analysis. Emphasis on ability to critically evaluate research studies and provide a foundation for conducting research.  
Prerequisite: Undergraduate statistics class with a C or better

**PSY 535 Treating Diverse Populations**  
(W): (3-0-3) SS  
Examines the cultural context of relationships, issues, trends in a diverse society, including culture, ethnicity, nationality, age, gender, sexual orientation, spirituality, religion, larger system and social context. Strengths and limitations of models of treatment as they relate to a different cultural, economic and ethnic groups.  
Prerequisite: PSY 505

**PSY 565 Group Counseling**  
(W): (3-0-3) SS  
Theoretical understanding of group dynamics and group process. Evidenced based group interventions for psychoeducational and process groups.  
Prerequisite: PSY 522

**PSY 566 Child & Adolescent Therapy**  
(S): (3-0-3) SS  
Specific emphasis on treatment of children and adolescents. Course materials will cover a variety of childhood disorders and evidence-based interventions including individual and family interventions.  
Prerequisites: PSY 500, PSY 521
Courses with the following notation fulfill the appropriate general education requirements:

**C** - Communication  
**H** - Humanities  
**HP** - Humanities Performance  
**SS** - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31

RCP 345 Cardiopulmonary Diagnosis and Monitoring (W)(2-3-3)
Collaborative investigation, practice, calibration and interpretation of spirometry, body plethysmography, diffusion capacity, helium dilution, seven minute nitrogen washout, cardiopulmonary stress testing, 12 lead ECG acquisition, dysrhythmia recognition, arterial blood gas instrumentation.
Prerequisite: RCP 337.

RCP 350 Introduction to Clinical (S)(1-24-9)
Orientation to clinical practice in hospitals. Requires successful criminal background check, drug screening, completion of training in computer charting and compliance with Health Insurance Portability and Accounting Act (HIPAA). Competence developed in the area of basic patient assessment, oxygen therapy, aerosol therapy and mechanical ventilation.
Prerequisite: RCP 241.

RCP 351 Mechanical Ventilation I (F)(3-3-4)
Prerequisite: RCP 235.

RCP 352 Mechanical Ventilation II (W,S)(3-3-4)
Description and analysis of the adult patient-mechanical ventilator system including the initiation, assessment, management and discontinuance.
Prerequisite: RCP 351.

RCP 353 Mechanical Ventilation III (S)(3-3-4)
Advanced topics in mechanical ventilation including transport, dual modes, neonatal and pediatric mechanical ventilation.
Prerequisite: RCP 352.

RCP 366 Clinical Simulation (S)(3-0-3)
The practice and measurement of critical thinking in the context of computer branching logic simulations. Students use organized sequential topical examinations to review and measure retention of respiratory care content. Passage of secure national review examination required.
Prerequisite: RCP 337.

RCP 385 Critical Care I (S)(4-0-4)
Prerequisite: RCP 337.

RCP 387 Critical Care II (F,W)(2-0-2)
Advanced techniques during intubation. Assessment of the difficult airway including Mallampati classification and thyromental distance. Continued practice and an extension of hemodynamic, pharmacology and imaging knowledge. Students practice anticipating care based on nutritional status.
Prerequisite: RCP 241.

RCP 388 Advanced Neonatal Respiratory Care (F)(3-3-4)
Survey of perinatal physiology with an emphasis on mechanical ventilation, the application of oxygen, medications, positive pressure, resuscitative efforts and evaluations as applied to the neonatal and pediatric patient. Instruction in neonatal resuscitation meets the standards established by the American Academy of Pediatrics.
Prerequisite: RCP 241.

RCP 389 International Neonatology (3-3-4)
Advanced topics in neonatal and pediatric respiratory care including transport, stabilization and care in resource limited international settings.
Prerequisite: RCP 241.

RCP 440 Case Management I (F,W,S)(3-0-3)
Current clinical cases used as the basis for scholarly research and discussion. Students design a research-based senior project in the field of respiratory care, including interviews, research, literature review and formal presentation.
Prerequisite: Completion of all academic coursework in the Respiratory Care Program prior to the senior year.

RCP 441 Case Management II (F,W,S)(3-0-3)
Current clinical cases used as the basis for scholarly research and discussion. Students continue work on senior project in the field of respiratory care, including interviews, research, literature review and formal presentation.
Prerequisite: RCP 440.

RCP 442 Case Management III (F,W,S)(3-0-3)
Current clinical cases used as the basis for scholarly research and discussion. Students complete work on senior project in the fields of respiratory care, including formal presentation of the project.
Prerequisite: RCP 441.

Continued development of respiratory care skills, mechanical ventilation and neonatal intensive care, expanded functions and observations in specialty areas.
Prerequisite: RCP 450 for RCP 451, RCP 451 for RCP 452.

RCP 460 Advanced Life Support (S)(0-6-2)
Students become certified or recertified in professional life support classes such as Basic Life Support, Advanced Cardiac Life Support, Neonatal Life Support, Pediatric Life Support. Clinical simulations and other credentialing exam preparation included.
Prerequisite: RCP 252.

RCP 486 Extreme Physiology (F,W)(2-0-2)
Physiologic adaptations to gas exchange and transport which occurs during the challenges of neonatal transition, exercise, high altitude and high-pressure environments.
Prerequisite: RRT credential and admission to degree completion program.

RCP 487 Expert Mechanical Ventilation (F,W,S)(2-0-2)
Recognition of levels of quality in mechanical ventilation. Practicing clinicians balance experience with current evidence-based recommendations for mechanical ventilation in order to develop a hierarchy of quality care.
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication   H - Humanities   HP - Humanities Performance   SS - Social Science

Includes selection of new modes, patient-ventilator synchrony, the reduction of medical errors and ventilator associated pneumonia.
Prerequisite: RRT credential and admission to degree completion program.

RCP 488 Respiratory Care Innovations
(F,S)(2-0-2)
Exploration of new opportunities to improve access to respiratory care. Reduction of disease through the expansion of respiratory care. Student projects focused on networking among students and faculty and across institutional, professional and nonprofit lines to implement improvements in health and education.
Prerequisite: RRT credential and admission to degree completion program.

(RDSC) Radiologic Science
RDSC 105 Radiation Protection and Radiographic Quality Control
(S)(3-0-3)
Principles of radiation protection and radiographic quality control for veterinary x-ray operators in accordance with Oregon Administrative Rules. Students majoring in Radiologic Science are not eligible.

RDSC 107, RDSC 207, RDSC 307, RDSC 407 Seminar
(Hours to be arranged each term.)

RDSC 201 Imaging Techniques I
(F)(3-3-4)
Demonstration and practice with the phenomena and causes of image formation and visualization. The context includes studies of effects of technique-factor changes, effects of the use of various accessories and effects of chemicals in film processing. Causes of radiographic artifacts are discussed and explored. Includes the study of interactions of radiation and matter.
Prerequisite: MIT 103 with grade “C” or better.

RDSC 202 Imaging Techniques II
(W)(3-3-4)
Prerequisite: RDSC 201 with grade “C” or better.

RDSC 205 Patient Care
(W)(3-3-4)
Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the radiographer in patient education.
Prerequisite: MIT 103.

RDSC 210 Radiographic Positioning I
(W)(3-3-4)
Demonstration and practice of the routine and special radiographic positions of bones of the upper and lower extremities excluding the shoulder and pelvic girdles.
Prerequisites: RDSC 201 and RDSC 235 with grade “C” or better.

RDSC 211 Radiographic Positioning II
(S)(3-3-4)
Demonstration and practice of routine and special radiographic positions of the axial skeleton, shoulder, and pelvic girdles.
Prerequisites: RDSC 202, RDSC 210, and RDSC 235 with grade "C" or better.

RDSC 215 Radiographic Positioning
(F,S)(2-0-2)
A Sequential review of osteology and positioning designed for the medical imaging technology student. Focuses on instruction of the upper and lower extremities excluding the shoulder and pelvic girdles.
Prerequisites: RDSC 201 and RDSC 235 with grade “C” or better.

RDSC 230 Surgical, Trauma and Mobile Radiography
(F)(3-3-4)
Routine radiographic examinations of the reproductive, muscular, nervous, skeletal and circulatory systems. Also including emergency and surgical procedures, using various contrast media and filming techniques. The comprehensive study of all radiographically significant anatomy, physiology, pathology, terminology, and topography including all contrast studies of these systems. Control of microorganism by physical and chemical means is incorporated as necessary.

RDSC 301 Radiographic Positioning III
(F)(3-3-4)
Demonstration and practice of routine and special radiographic positions of the skull, facial bones, and paranasal sinuses.
Prerequisites: RDSC 211 and RDSC 233 with grade “C” or better.

RDSC 305 Equipment Operation and Maintenance
(F)(3-3-4)
Basic components and operation of radiographic, fluoroscopic, and mobile units. Evaluation, calibration, and maintenance of radiographic equipment and accessories.

RDSC 320 Imaging Techniques I
(W)(3-3-4)
Prerequisite: RDSC 201 with grade “C” or better.

RDSC 326 Cardiovascular/Interventional Technology
(S)(3-3-4)
Demonstration and practice of special radiographic examinations of nervous and vascular systems including use of serial film changers and pressure injectors, and other necessary equipment. Also includes related nursing procedures.
Prerequisites: RDSC 211, RDSC 233, and RDSC 320 with grade “C” or better.

RDSC 350 Bones: The Interactive Anatomy and Position Course
(F,W)(2-0-2) A sequential review of osteology and positioning designed for the medical imaging technology student that has completed the positioning sequence, or the graduate seeking continuing education credit.
Prerequisites: RDSC 210, RDSC 211, RDSC 301, or Registered Radiologic Technologist.

RDSC 355 Radiologic Methods and Procedures
(F)(2-0-2)
Principles of radiation protection and radiographic quality control for veterinary x-ray operators in accordance with Oregon Administrative Rules. Students majoring in Radiologic Science are not eligible.

RDSC 354 Mammography
(S)(3-3-4)
An in-depth analysis of mammographic positioning, exposure techniques, quality control, film critiquing, and radiation safety. Includes mock registry exam.
Prerequisite: RDSC 301.
RDSC 355 Computed Tomography  
(F)(3-3-4)  
X-ray physics, scanner components, and data acquisition of computed tomography. Image reconstruction, manipulation, and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis, and musculoskeletal system. Laboratory simulation is included. Prerequisite: RDSC 356.

RDSC 356 Magnetic Resonance  
(W)(3-3-4)  
Physics and principles used in the production of magnetic resonance images and spectroscopy. Static magnetic fields, gradient magnetic fields, secondary coil fields, nuclear magnetic resonance (NMR), spatial domain, frequency domain, computer data acquisition, relaxation times, pulse sequence diagrams. Laboratory simulation is included. Prerequisites: BIO 335 and PHY 201 or PHY 217 all with grade “C” or better.

RDSC 357 Radiologic Science Externship Prepartion  
(F)(2-0-2)  
Presentation of key concepts related to Radiologic Science externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the Radiologic Science Externship Handbook. This course is a mandatory course that must be completed prior to externship. Prerequisite: RDSC 356.

RDSC 365 Advanced Quality Assurance/Quality Control  
(S)(3-3-4)  
Principles of diagnostic radiographic quality assurance systems including: quality control testing, equipment calibration, preventive maintenance, and government regulations. Laboratory experiments involve QC tests and measurements. Prerequisites: RDSC 202, RDSC 272.

RDSC 366 Radiographic Pathology  
(W)(3-0-3)  
An overview of common pathological conditions encountered in the clinical setting, for RDSC students. Pathology is categorized by body systems. The students will learn the pathology as they relate to: signs and symptoms, etiology, imaging diagnosis and prognosis and treatment.

RDSC 388 Externship Preparation  
(S)(2-0-2)  
Prerequisite: RDSC 356.

RDSC 410 Radiologic Science Externship  
(F,W,S)(0-40-15)  
Students must complete four terms (12 months) of clinical experience in both general radiography and special imaging modalities, to include computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and/or cardiovascular/interventional technology at an affiliated clinical site. Students will complete all phases of general radiography and a maximum of 12 weeks in the special imaging modalities. Students under the direct supervision of qualified radiographers and radiologists. Prerequisites: All academic coursework in the Radiologic Science curriculum.

RDSC 411 Special Radiologic Science Externship  
(F,W,S)(0-40-15)  
This one-term (three-month) practicum is designed to develop the skills of the student in the special imaging modalities, i.e., computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and special radiographic procedures. The student is sent to an affiliated hospital that has the required special imaging equipment to give the hands-on experience to develop competency in each of three areas chosen by the student. The student will spend one month in each selected area. Prerequisites: The student must have completed all academic coursework in the Medical Imaging program with grade “C” or better and be a Registered Technologist.

RDSC 411A, RDSC 411B Special Radiologic Science Externship  
(411A-F,W, 0-18-7)(411B-W, 0-22-8)  
This two-term practicum is designed to develop the skills of the degree completion student in special imaging modalities of computed tomography, magnetic resonance imaging, cardiovascular/interventional technology, mammography, quality assurance, nuclear medicine technology, or sonography. The student selects a local hospital or medical center that has the necessary equipment. Upon approval of the facility, the student begins a supervised experience to develop competencies in each of three chosen areas. Prerequisites: Be an ARRT registered technologist in good standing, and have completed all the academic coursework in the Medical Imaging curriculum with grade “C” or better.

RDSC 471 Clinical Imaging Education I  
(S)(1-0-1)  
Development and application of clinical education objectives relating to medical imaging technology. Instruments used to evaluate student clinical performance and competence. Prerequisite: RT(R) (ARRT).

(REE) Renewable Energy Engineering  
REE 107, REE 207, REE 307, REE 407 Seminar  
(Hours to be arranged each term.)

REE 201 Introduction to Renewable Energy  
(F,S)(3-3-4)  
An introduction to renewable energy. Topics include photovoltaics, solar thermal systems, green building, fuel-cells, hydrogen, wind power, waste heat, biofuels, wave power, tidal power and hydroelectric. Discussions of economic, environment, politics and social policy are integral components of the course. Prerequisite: MATH 111.

REE 243 Electrical Power  
(F,S)(3-3-4)  
Fundamentals of electrical power. Power systems components and equipment. Fundamental analysis and design of electrical power systems. Prerequisites: EE 223; MATH 252; PHY222

REE 253 Electromechanical Energy Conversion  
(F,S)(2-3-3)  
Motoring and generating principles for direct current, synchronous, and induction Machines. Analysis and design of motor and generator power and control circuits. Prerequisite: EE 223; MATH 252; PHY222

REE 331 Fuel Cells  
(F,S)(2-3-3)  
Introduction to fuel cell technologies: PEM, PAFC, AFC, SOFC, MCFC and DMFC systems. Fuel cell components and systems; field flow plates, electrolytes, electrode materials, electrode catalysts, on-board reformers. Portable devices, utility-scale power production, transportation systems. Fuel types and fuel storage. Prerequisites: CHE 260 and PHY 222.
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

REE 333 Batteries
(F,W)(2-3-3)
This course covers fundamentals of the most important battery types including alkaline, zinc-air, lead-acid, nickel-cadmium, nickel-metal hydride, lithium ion and lithium polymer. Applications include stationary, transportation and portable batteries. The lab deals with battery system design, testing and prototype assembly.
Prerequisite: CHE 260.

REE 335 Hydrogen
(S)(2-3-3)
This course will cover hydrogen production, storage, distribution and use. Specific energy scenarios such as renewable hydrogen cycles will be explored focusing on transportation applications. The concept of hydrogen economy will be discussed in the context of global energy crisis. Prerequisite: CHE 202.

REE 337 Materials for RE Applications
(F,W)(3-0-3)
Electrical, mechanical, thermal, chemical, optical, and processing properties of materials in renewable energy systems; solid-state device characteristics and their material properties. Engineering applications.
Prerequisites: CHEM 202 and CHEM 205 or CHE 222; PHY 223.

REE 344 Nuclear Energy
(3-0-3)
Prerequisites: CHE 202 and CHE 205 or CHE 222; PHY 223.

REE 345 Wind Power
(S)(3-0-3)
Prerequisites: REE 253 or MECH 326. PHY 222.

REE 346 Biofuels and Biomass
(F,W)(2-3-3)
Introduction to power production from biomass resources. Historical uses of biomass resources. Biomass as a solar energy store; forestry and agricultural sources, crop wastes. Recycled sources; municipal solid wastes, landfill gas. Gaseous fuels; anaerobic digestion, gasification, liquid fuels, fermentation, hydrolysis, transesterification.
Prerequisites: CHE 202; or CHE 222, PHY 222.

REE 347 Hydroelectric Power
(S)(3-0-3)
Prerequisite: MECH 318.

REE 348 Solar Thermal Energy Systems
(F)(3-0-3)
Introduction to solar thermal energy systems for residential, commercial and industrial applications. Solar radiation; topics in heat transfer; flat plate and concentrating collectors; non-imaging optics; applications including water heating, building heating, cooling, industrial process heat, distillation, solar thermal power systems.
Prerequisites: MECH 323, ENGR 355.

REE 412 Photovoltaic Systems
(F,W,S)(3-0-3)
The solar resource, sun charts, site assessments, Grid-connected and stand-alone systems. Module and array performance. PV system components including batteries, modules, charge controllers, maximum power point trackers, inverters. Economic considerations including investment tax credits, present-value analysis, IRR. Advanced PV materials.
Prerequisite: EE 343 or REE 337.

REE 413 Electric Power Conversion Systems
(S)(2-3-3)
Power electronics devices in energy applications. DC-DC MPPT and charge controllers. Advanced inverter controls and applications. FACTS and HVDC systems and equipment.
Prerequisites: EE 419, REE 243

REE 425 Electricity Markets and Modeling
(S)(3-0-3)
Introduction to restructured electricity markets. Students gain knowledge of theory, structures, successes and failures of markets, market participant behavior, risk and uncertainty, and basic simulation and optimization modeling for market analyses.
Prerequisites: MATH 111 and ECO 201 or ECO 202.

REE 427 Greenhouse Gas Accounting/Footprints
(S)(3-0-3)
Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as ENV 427 (cannot be used for graduation credit by students who have taken ENV 427).
Prerequisites: Junior or senior standing, MATH 361 or MATH 465; WRI 227.

REE 431 Geothermal Heat Pump Design
(W)(3-0-3)
Theory/design of geothermal heat pump applications, emphasis ground heat exchanger simulation and design. Closed-loop, open-loop, and hybrid geothermal heat pump systems will be examined. Exposure to the development and use of geothermal design and simulation tools.
Prerequisite: MECH 323

REE 439 Building Energy Auditing and Management
(W)(3-0-3)
Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.
Prerequisite: MECH 433.

REE 451 Geothermal Energy and Direct Use Applications
(F)(3-0-3)
Courses with the following notation fulfill the appropriate general education requirements:

C - Communication
H - Humanities
HP - Humanities Performance
SS - Social Science

Introduction to basic geothermal energy sources and generation. Basic geothermal energy applications including direct use, heat pumps and power generation. Geothermal reservoir, site analysis, exploration and drilling, Direct use application system design (HVAC) and equipment.

Prerequisite: ENGR 355 Thermodynamics.

**REE 453 Power System Analysis**  
(F)(3-0-3)  

Prerequisites: REE 253 or MECH 326. MECH 323.

**REE 454 Power System Protection and Control**  
(W)(3-0-3)  
Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power system protection and control using power system analysis software, emphasizing renewable resources.

Prerequisite: REE 453.

**REE 455 Energy-Efficient Building Design**  
(S)(3-0-3)  
Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

Prerequisite: MECH 323.

**REE 463 Energy Systems Instrumentation**  
(F,W,S)(2-3-3)  
Application of electrical and mechanical sensors, data acquisition and logic controllers as applied to energy systems. Determination of physical parameters necessary for control and data-logging. Methods of calibration and correction.

Prerequisite: EE 321.

**REE 465 Renewable Energy Transportation Systems**  
(W)(3-0-3)  
Renewable energy transportation systems including fuel cells, hybrid gasoline-electric engines, electric vehicles, bio-diesel, flex-fuel vehicles, high-efficiency diesel engines, gas turbine prime-mover systems. Topics include fuel-air mixing, fuel storage, fuel delivery, cooling, fuel leak detection, chemical safety, and electrical power control systems.

Prerequisites: REE 253 or MECH 326. MECH 323.

**REE 469 Grid Integration of Renewables**  
(S)(3-0-3)  
Issues unique to connecting renewable energy generation to the grid, Microgrids, Stability, transient and harmonic effects. Interconnect agreements and requirements, Standards development. SCADA and smart grid concepts, System optimization.

Prerequisite: REE 454.

**REE 471 Geothermal Power Plant Design**  
(S)(3-0-3)  
Introduction to geothermal reservoir pressure, temperature and flow models and analysis. Basic geothermal power plant equipment and design for dry steam, single/double flash and binary cycle power plants. Plant thermodynamic analysis/efficiency using Rankine/Kalina cycles. Plant environmental, economic and social impacts.

Prerequisite: ENGR 355

**REE 511 Research Methods & Innovation I**  
(F)(3-0-3)  
Fundamental concepts of scientific research. An introduction to the concepts underlying peer-reviewed research, evaluating the relevance and impact of sources, conducting literature reviews, evaluating published findings, using research productivity tools, using statistical methods, designing research studies, and writing scholarly articles.

**REE 512 Research Methods & Innovation II**  
(W)(3-0-3)  
Intellectual property (IP) development, evaluation, and strategy. IP fundamentals, patent fundamentals, conducting patentability searches, evaluating the patentability potential of an invention, drafting invention disclosures for patent applications, assessing the value of a patent or patent portfolio, and IP licensing fundamentals.

**REE 513 Research Methods & Innovation III**  
(S)(3-0-3)  
Strategy and innovation concepts with a focus on technology commercialization. Business strategy frameworks, financial analysis, strategic marketing, operations management, business models, project management, business law, and entrepreneurship.

**REE 515, REE 516, REE 517 Energy Engineering I, II, III**  
(515-F)(3-0-3) (516-W)(3-0-3) (517-S)(3-0-3)  
Three-term sequence in energy engineering. For a variety of renewable and conventional means of energy production, storage, and distribution, students gain a robust understanding of resources, energy conversion technology, integration with existing systems, regulatory contexts, business environment, and future trends.

**REE 521 Production of Biomass & Biofuels**  
(3-0-3)  
The use of recently living plant or animal materials as sources of fuels, chemicals or industrial products. Sourcing and production. Biomass chemistry; lignocellulosics, fats, oils, saccharides, polysaccharides, proteins, and extractables. Chemical modification of biomass to produce fuels, polymers, industrial chemicals.

**REE 523 Hydrogen Production and Storage**  
(3-0-3)  
An overview of primary technologies, economic aspects, and social policy issues related to development of hydrogen systems and hydrogen economy, including water electrolysis, reformer technologies, and hydrogen storage.

**REE 525 Solid-State Physics of Photovoltaic Materials**  
(3-0-3)  
REE 527 Wind Power Generators
(3-0-3)
Wind energy as a power source. AC machines, particularly three-phase induction and synchronous generators for wind power generation. Equivalent circuit models. Wound-rotor, permanent magnet, multi-pole, and switched-reluctance generators. Power and torque control.

REE 529 Power System Analysis
(3-0-3)

REE 531 Ground-Source Heat Pumps
(3-0-3)

REE 533 Heating, Ventilation and Air Conditioning
(3-0-3)
Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

REE 535 Fuel Cell Fundamentals
(3-0-3)
Basic science and technology of fuel cells, electrode processes, electrolyte types, catalysts, and balance of plant components.

REE 537 Sustainability of Energy Systems
(3-0-3)
Comprehensive examination and classification of the local, regional, and global environmental and social aspects of energy use including lifecycle assessments. Impacts of global and national politics on energy use decisions.

REE 539 Hydraulics & Fluid Mech. of Hydropower
(3-0-3)
Open-channel hydraulics, including watershed hydrology, sediment transport and bed load movement, reservoirs, hydrostatics, dredging, spillways, stilling basins, and hydraulic jumps. Advanced fluid mechanics. Types of turbines. Modeling and unit optimization. Background in fluid mechanics required.

REE 541 Utilization Strategies of Bioenergy
(3-0-3)

REE 543 Materials for Electrochemical Processes
(3-0-3)
Materials used for batteries, fuel cells, electrolyzers, and supercapacitors; their classification, selection and properties, including nanocatalysts, polymer electrolytes, ceramic and plastic packaging materials, and metals.

REE 545 Applied Photovoltaics
(3-0-3)

REE 547 Electric Power Conversion
(3-0-3)

REE 549 Power System Protection & Control
(3-0-3)
Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power systems protection and control using power system analysis software, emphasizing renewable resources. Prerequisite: REE 529

REE 551 Advanced Geothermal Energy
(3-0-3)
Classification of geothermal resources. Basics of geothermal wells and drilling. Resource capacity estimation and measurement. System design and integration. Applications such as aquaculture, greenhouses, and district heating.

REE 553 Energy Systems Management and Auditing
(3-0-3)
Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

REE 555 Stationary Fuel Cells
(3-0-3)
Advanced treatise of fuel cell systems for large, stationary applications with detailed examination of polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, and solid-oxide systems, their design, performance, lifetime and reliability, modeling, and economics.

REE 557 Costing Renewable Energy
(3-0-3)
Renewable energy in micro- and macroeconomic contexts. Review and discussion of current energy market structures, prices, effects of inflation and incentives, affordability, costs of supply reliability, investment criteria, and modeling market trends.

REE 559 Development of Hydropower Projects
(3-0-3)
Mechanical and electrical equipment, including flow control elements, generators, transformers, protection and control equipment, and governors. Transient responses and stability. The engineering, procurement and construction process for hydropower projects. Commissioning and documentation.
REE 561 Process Design and Economic Evaluation for Biomass Energy Systems
(3-0-3)
Process engineering methods, including development of process and instrumentation diagrams (P&ID); equipment selection and sizing; cost estimation, economic evaluation; and, fundamentals of chemical process safety.

REE 563 Batteries
(3-0-3)
Comprehensive overview, integration characteristics, and performance comparison of battery systems for transportation and stationary applications, including lead-acid, nickel metal hydride, nickel cadmium, sodium-sulfur, lithium polymer, and lithium ion.

REE 565 Semiconductor Process Engineering
(3-0-3)

REE 567 Wind Energy Systems Integration
(3-0-3)

REE 569 Grid Integration of Renewables
(3-0-3)
Issues unique to connecting renewable energy generation to the grid. Microgrids. Stability, transient, and harmonic effects. Interconnect agreements and requirements. SCADA and smart grid concepts. System optimization. Prerequisite: REE 549

REE 571 Geothermal Power Generation
(3-0-3)
High-enthalpy resources suitable for electric power generation. Energy transfer and conversion. Plant design and integration. Advanced design such as absorption power cycles.

REE 573 Energy-Efficient Building Design
(3-0-3)
Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

REE 575 Transportation Fuel Cells
(3-0-3)
Detailed assessment of advances, prospects, and economics of polymer electrolyte membrane fuel cell, operational characteristics, durability, manufacturing, and fuel storage options in the automotive applications.

REE 577 Renewable Energy Integration
(3-0-3)
Discussion based-class on the integration of renewable energy into the established electric grid, focusing on energy availability, reliability, options for integration, matching demand, and balancing economic options on global, regional, and local scales.

REE 579 Economic, Regulatory, and Environmental Aspects of Hydropower
(3-0-3)
Duration curves and generation studies. FERC permitting and licensing, including compliance. Power sales contracts and bundled services. Environmental impact assessments. Project financing, management, and operations requirements. Optimization of integrated hydropower systems.

REE 581 Energy Storage Fundamentals
(F)(3-0-3)
The survey course will examine energy storage fundamentals; applications and trends for pumped hydro, compressed air, flywheels, superconducting magnetic energy storage, gravitational mass, supercapacitors, batteries, fuel cells, and thermal systems.

REE 582 Introduction to Batteries
(W)(3-0-3)
The course will examine technology and trends in battery chemistry, manufacturing, pack assembly, characterization, safety, economics and applications for battery systems including lead acid, nickel-based, lithium ion, lithium polymer, metal air and flow batteries.

REE 583 Introduction to Fuel Cells
(S)(3-0-3)
This overview course will introduce students to fundamental fuel cell principles, history, classification, thermodynamics, efficiency and causes of voltage losses, reaction kinetics, electrode performance and catalyst design, and fuel cell components and their impact on performance.

REE 591 Hydrogen Production and Storage
(F)(3-0-3)
The course will discuss the basics of hydrogen production and storage, the concept of hydrogen economy, conventional hydrogen generation, electrochemical and photochemical technologies, principles of hydrogen storage and novel storage materials.

REE 592 Advanced Batteries
(W)(3-0-3)
This course will examine technology and trends in battery chemistry, manufacturing, pack assembly, characterization, safety, economics and applications for battery systems including lead acid, nickel-based, lithium ion, lithium polymer, metal air and flow batteries.

REE 593 Advanced Fuel Cells
(S)(3-0-3)
This course provides an in-depth analysis of the current trends, fuel processing, novel materials, applications, safety, and characterization for polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, solid oxide, and direct methanol fuel cells.

(SEM) System Engineering and Technology Management
SEM 421 Systems Engineering
(F)(4-0-4)
Foundations of Systems Engineering; Structure of Complex Systems; System Development Processes and Frameworks; Systems Engineering Management; System Needs Analysis; System Design & Development; System Engineering Validation, Reliability,
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science

For more information, see page 31
Courses with the following notation fulfill the appropriate general education requirements:
C - Communication  H - Humanities  HP - Humanities Performance  SS - Social Science
These include clinical assessment, physiological evaluation and duplex imaging of lower extremity arteries. Prerequisite: VAS 214.

**VAS 335 Radiographic Vascular Anatomy**  
(W)(3-0-3)  
Survey of medical imaging modalities ancillary to vascular sonography including angiography, digital subtraction angiography, computerized tomography and magnetic resonance angiography. Student teams will prepare case studies comparing the efficacy of these imaging modalities. Prerequisite: VAS 214 with grade “C” or better.

**VAS 337 Survey of Echocardiography**  
(W)(2-3-3)  
A survey of basic echocardiography with emphasis on normal cardiac anatomy and abnormal disease states. Standard sonographic imaging techniques of adult echocardiography, including instrumentation and protocols. Prerequisites: BIO 220.

**VAS 365 Abdominal Vascular Disease**  
(F.W,S)(3-3-4)  
Diagnostic methods of abdominal and visceral vascular disease testing. Includes aorto-iliac, renal artery and kidney, mesenteric system, liver system, and transplantsations. Laboratory emphasizes advanced instrumentation and scanning techniques, patient interviews, clinical signs and symptoms, physical assessment and findings. Prerequisite: VAS 246.

**VAS 366 Special Circulatory Problems**  
(F.W,S)(3-3-4)  
Diagnostic methods of testing the efficacy of vascular surgical procedures and interventions. To include arterial bypass grafts, organ transplants and dialysis access grafts. Venous and arterial mapping, upper extremity venous and arterial disease testing, IVUS, pseudoaneurysm treatment and compartment syndrome will also be covered. Prerequisite: VAS 365.

**VAS 367 Cerebrovascular Disease**  
(S)(3-3-4)  
Theoretical and practical considerations of diagnostic methods of testing arterial and venous diseases affecting the vasculature of the head and neck including the intracerebral vessels. Laboratory includes advanced instrumentation and scanning techniques, and instruction on patient interviewing, clinical signs and symptoms, physical assessment and findings. Prerequisites: VAS 366, VAS 375.

**VAS 375 Survey of Abdominal Sonography**  
(F)(3-0-3)  

**VAS 385 Vascular Laboratory Management**  
(F,W,S)(3-0-3)  
Focus on human resource skills as necessary to manage a vascular laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues. Corequisite: VAS 388.

**VAS 388 Externship Preparation**  
(S)(3-0-3)  
Review and summarization of key concepts in Vascular Technology. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent vascular lab. Review and discussion of the Vascular Technology Externship Handbook. Prerequisites: VAS 366, VAS 375 with grade “C” or better. Corequisites: VAS 367, VAS 385.

**VAS 420 Vascular Technology Externship**  
(F,W,S)(0-40-15)  
All B.S. students complete four terms (12 months) of clinical experience in Vascular Technology at an affiliated clinical site. Students work under the direct supervision of Registered Vascular Technologists and provide monthly log sheets and evaluation forms. Students prepare clinical case studies each term. Prerequisites: All academic coursework in the Vascular Technology curriculum.

This two-term special externship is designed for the degree completion student. Students working in a clinical vascular setting will prepare clinical case studies as well as rotate through special imaging modalities. Prerequisites: Be an ARDMS or CCI Registered Vascular Technologist in good standing, and have completed academic coursework in the Medical Imaging curriculum with grade “C” or better.

**WRI 107, WRI 207, WRI 307, WRI 407 Seminar**  
(Hours to be arranged each term.)

**WRI 115 Introduction to Writing**  
(F,W)(3-0-3)  
Focuses on sentence structure, paragraph coherence, and essays. Regular writing and feedback develop student competency in college level writing. May not be used to meet general education requirement or graduation credit. Prerequisites: Writing ability as demonstrated by SAT/ACT score and/or writing sample.

**WRI 121 English Composition**  
(F,W,S)(3-0-3) C  
Introduces critical reasoning and analysis. Explores connections between thesis, structure, tone and purpose; includes writing process, rhetorical strategies applications. Focuses on academic reading, writing and research skills. Prerequisite: Writing ability as demonstrated by SAT/ACT score and/or writing sample.

**WRI 122 Argumentative Writing**  
(F,W,S)(3-0-3) C  
Designed to develop skills in ethical argument, research, critical thinking. Multipage papers, including argumentative research paper, required. Focuses on writing process with attention to audience, effective style, overall rhetorical effect. Prerequisite: WRI 121 with grade “C” or better.

**WRI 123 Research Writing**  
(S)(3-0-3) C  
Focuses on the formal research paper, including research techniques and process of developing a longer document. Prerequisite: WRI 122. Pre- or corequisite: SPE 111.
WRI 214 Business Correspondence  
(F)(3-0-3) C  
Focuses on theories and strategies governing written correspondence. Designed to equip the student to perform effectively in a variety of business writing situations; major emphasis on practical applications.  
Prerequisites: WRI 122 or equivalent.

WRI 227 Technical Report Writing  
(F,W,S)(3-0-3) C  
Focuses on techniques of gathering, organizing, and presenting technical information and graphics. Requires technical reports derived from realistic situations in the student’s major.  
Prerequisite: WRI 122.  
Pre- or corequisite: SPE 111.

WRI 305 Writing for the Marketplace  
(As required)(3-0-3)  
Designed to introduce the basics of professional writing – fiction, personal experience, and technical articles, etc. for publication, including marketing and manuscript preparation. Each student must submit at least one article or story (8 pages or more) for publication during the term.

WRI 327 Advanced Technical Writing  
(F,W,S)(3-0-3) C  
Processes involved in technical writing and methods of preparing technical data; offers a variety of writing problems to provide opportunities for the student to develop precision in statement and in graphic presentation.  
Prerequisite: WRI 227.

WRI 328 Technical Journalism  
(F,W,S)(2-3-3) C  
Production of a weekly newspaper (The Edge). Includes journalistic writing, design, layout, and production, as well as proposals, memos, business correspondence, and recommendation reports. May substitute for WRI 327 with approval of student’s major department.  
Prerequisites: WRI 227 and consent of instructor and advisor.

WRI 350 Documentation Development  
(W)(3-0-3) C  
Provides students with basic tools for preparing documentation. Focuses on usability of documentation and includes planning and scheduling, audience evaluation, use of appropriate examples and illustrations, style, editing technique, organization and research.  
Prerequisite: WRI 227.

WRI 410 Proposal and Grant Writing  
(S)(3-0-3) C  
Provides theory and skills in proposal writing for seeking funding from public and private agencies and for preparing proposals in business and industrial settings. Focuses on the process of preparing proposals, including analyzing audiences, conducting research, organizing, writing, and editing.  
Prerequisite: WRI 227.

WRI 415 Technical Editing  
(W)(3-0-3)  
Focuses on the role of the technical editor in business and industry. Examines the publishing process, the dynamics of the editor/writer relationship, and mechanics and techniques of proofreading and copyediting. Provides considerable practice in copyediting and proofreading manuscripts.  
Prerequisite: WRI 227 or appropriate work experience.

WRI 420 Document Design  
(S)(3-0-3)  
Applies publishing and graphic arts principles to the preparation of professional publications and presentation materials. Includes typography, design principles, the use of graphical elements, and integration of text and graphics.  
Prerequisites: SPE 111, WRI 227.

WRI 521 Writing at the Graduate Level  
(S)(3-0-3)  
Focuses on developing professional-level writing skills to produce a master’s thesis/project documentation. Includes structure, methodology, and emphasizes adherence to OIT manual and appropriate reference style. By end of term, students will have written a detailed prospectus and literature review.
Administrative Offices

Academic Agreements

Dow E213
(541) 885-1844
academicagreements@oit.edu
www.oit.edu/academic-agreements

Oregon Tech's Office of Academic Agreements cultivates and maintains partnerships with area high schools, community colleges, and universities that result in increased access and smooth transitions for students. The office forges meaningful relationships with educational partners by connecting faculties, coordinating partnerships, participating in pathways and other local and statewide advisory boards and providing internal and external communication and promotion of partnerships. The office develops dual enrollment agreements with college and university partners, coordinates dual credit and other programs with high schools locally and statewide, manages and coordinates articulation agreements, and develops and manages other academic agreements.

Information about the work of the Academic Agreements Office, Dual Enrollment with colleges and universities, dual credit with high schools and specific articulation agreements can be found on the web page or by contacting the office.

High School Programs for College Credit

(541) 885-1844 Klamath Falls
(503) 821-1297 Wilsonville
www.oit.edu/youth-programs

Advance Credit Program
The Advance Credit Program (ACP) is a partnership between Oregon Institute of Technology and the participating high school to offer qualified high school students the opportunity to receive college credit from Oregon Tech. Oregon Tech is partnered with more than 20 high schools and offers more than 15 introductory college courses. The Advance Credit Program consists of college courses taught in the high schools by college-level qualified high school instructors. These courses are offered as part of the regular high school curriculum with the option of registering for college credit from Oregon Tech. ACP gives students the opportunity to try college-level courses, gain valuable skills, and develop study habits for college.

High School Transition Program
The High School Transition Program (HST) at Oregon Institute of Technology gives qualified high school students the opportunity to come to the Klamath Falls or Wilsonville campus and take a college course for Oregon Tech credit. Students must be 14 years or older and are typically eligible to take 100- and 200-level courses. High school students must register through the Office of Academic Agreements.

The ACP and HST Programs allow Oregon Tech to reduce the normal tuition fee by a considerable amount. Cost to the participating high school student is $25 per credit.

Affirmative Action and Equal Opportunity

Human Resources Office, Snell 108
(541) 885-1108

The Affirmative Action Officer is charged with oversight and enforcement of Oregon Tech's compliance with relevant federal, state and university civil rights statutes, regulations and policies. Complaints and grievances related to unlawful discrimination, harassment, and sexual assault under Title IX of the Education Amendments, federal and state Civil Rights Acts, the Rehabilitation Act, the Americans With Disabilities Act, and other federal or state anti-discrimination and employment laws are to be directed to the Officer for resolution. The Officer also coordinates Oregon Tech's Equal Opportunity programs and activities which seek to maintain a learning and working environment that fosters diversity, inclusion and personal success.

Inquiries, requests for assistance, or grievances pertaining to Oregon Tech policies on discrimination, harassment, equal opportunity or access to programs and services should be directed to this office.

Assessment

(541) 885-1915
www.oit.edu/provost/learningoutcomes

Oregon Tech actively engages in assessment of both degree programs and broad institutional essential student learning outcomes (ESLOs). The director of Assessment, in conjunction with the Executive Committee of the Assessment Commission, leads the campus in these efforts.

Assessment plans are developed for each undergraduate and graduate degree program focusing on program learning outcomes created by each academic department. The faculty for the program identify strengths and weaknesses in student learning and recommend plans for improvement through a continuous program improvement process. Information on assessment of student learning outcomes is posted on the Oregon Tech website.

Oregon Tech faculty members also assess the ESLOs, which are intended to reflect common themes from departmental and program learning outcome statements. Information on assessment of ESLOS is posted on the Oregon Tech website at www.oit.edu/provost/eslo.
Campus Safety

Cornett 131A  
(541) 885-1111  
www.oit.edu/safety

The Campus Safety department administers the university’s security and parking programs. The department promotes security on the Oregon Tech campus through emergency and non-emergency response services, problem solving, and enforcement of appropriate laws, rules and regulations. The Campus Safety department also provides service functions such as crime prevention and crime reporting programs. Campus Safety patrol officers are available 24/7 for any concern, including disability issues that need immediate resolution or assistance. Our “Night Ride” assistance program is also available for any person that needs an escort from one area to another on campus 24/7.

College Union

Information Desk  
(541) 885-1030  
www.oit.edu/collegeunion

The College Union is the center of student activity on campus. Located within the Union are the student government offices, Campus Arts and Entertainment, the Diversi-

Marketing and Communication

Snell Hall  
(541) 885-1162  
marketing@oit.edu

The Marketing and Communication Department at Oregon Tech is responsible for developing and implementing integrated marketing and communication strategies designed to advance the university’s image and standing among a variety of constituents and audiences.

Student Affairs

College Union, 2nd Floor  
(541) 885-1011  
www.oit.edu/student-affairs

The Student Affairs Office is the office location for the Vice President for Student Affairs and the Dean of Students, and the Executive Assistant. The division of Student Affairs provides direct service to students in the following offices: Admissions, Campus Life, Campus Safety, College Union, Financial Aid, Housing & Residence Life, the Integrated Student Health Center, Retention Office, and the Student Success Center, which is composed of Career Services, Disability Services, Testing and Peer Consulting Services, and TOP (a Trio program).

The Vice President for Student Affairs and her staff maintain close relationships with students and student organizations and are available for consultation and collaboration on all matters pertaining to student well-being and success.

Strategic Partnerships and Government Relations

Wilsonville  
(503) 821-1247  
www.oit.edu/strategic-partnerships

The Office of Strategic Partnerships (OSP) and Government Relations promotes and oversees industry and government relationships at the Oregon Institute of Technology. The staff is responsible for campus-wide promotion of the University’s economic development mission by facilitating the external relationships that enable the University to contribute to the vitality of its campus regions and the state of Oregon.

The OSP has responsibility for:

1. Building long-term partnerships with businesses and industry associations that are crucial to Oregon Tech’s mission;

2. Providing support to secure external funding by leveraging private sector partnerships for grants and sponsored projects;

3. Proactively working with faculty to develop collaborations with industry...
that lead to sponsored projects, commercialization and entrepreneurial opportunities;

4. Building an alliance of local, state and national support for Oregon Tech’s policy and funding priorities; and

5. Representing the University on strategic partnerships, industry affairs, and legislative advisory councils.

The OSP collaborates with the Office of Sponsored Projects & Grants Administration (SPA) and the Office of Innovation and Technology Transfer (OITT) to determine Oregon Tech’s research priorities and align faculty research interests with industry, other universities, and economic development and research organizations. Operationally, the Office of Strategic Partnerships reports to the President and the Provost to advance the University’s strategic priorities.

**Business and Industry Partnerships**

The Office of Strategic Partnerships assists Oregon Tech’s faculty at all locations to connect to industry partners and advisors to ensure that Oregon Tech’s courses integrate new technologies and are responsive to business needs for skilled professionals. Businesses throughout the Pacific Northwest, such as Intel, Pacific Power, Maxim, PCC Structural, Oregon Cutting Systems, Jeld-Wen, Providence and the Boeing Company, send their best and brightest to Oregon Tech for professional development so they can advance into engineering, technology, healthcare and management positions within their companies.

Oregon Tech’s business partners participate on Industry Advisory Councils, support students through internships and sponsored student projects, teach as adjunct faculty, recruit graduates for jobs, donate labs and equipment, and sponsor applied research. Oregon Tech could not fully execute its mission without the engagement and support of industry partners.

Oregon Tech is a member or partner with the Smart Grid Oregon, Drive Oregon, Oregon Solar Energy Industry Association, Renewable Northwest Project, Northwest Collaboratory for Sustainable Manufacturing, Oregon BEST (Built Environment & Sustainable Technology), Manufacturing 21 Coalition, Northwest High Performance Enterprise Consortium, Pacific Northwest Defense Coalition, Gorge Technology Alliance, Technology Alliance of Oregon, Oregon Manufacturing Extension Partnership, Oregon Workforce Investment Board and several local workforce boards, Oregon Transportation Research and Education Consortium, Oregon Healthcare Workforce Institute, and the Greater Portland, Klamath Falls, Tualatin, and Wilsonville Chambers of Commerce.

Individual businesses or business associations that are interested in university-industry partnerships are encouraged to contact the Associate Vice President for Strategic Partnerships at (503) 821-1247.

**Governement Relations**

Oregon Tech’s government relations activities support the university community’s vision “Oregon Tech will be a nationally recognized public polytechnic university delivering in-demand, industry-focused degrees and graduates ready to meet workforce needs in Oregon and the Northwest.”

Working with local, state and national elected and appointed leaders, Oregon Tech’s government relations efforts are focused on enhancing student and graduate success, continuing excellence in applied degree programs, providing statewide educational opportunities, and increasing service to the community.

Oregon Tech provides information to local, state and national legislator and policy makers on:

- Increasing access for rural and under-served students to science, technology, engineering and math (STEM) degree programs
- Workforce development support for local industries, such as healthcare, energy, and manufacturing
- Education policy and reform including Oregon Tech’s initiatives to achieve the state’s and nation’s educational goals
- Financial aid and student access initiatives, with a focus on rural students and first-generation college students
- Reauthorization bills that impact Oregon Tech’s portfolio of programs
- Federal competitive grants to enhance Oregon Tech’s degree programs and net-zero campus initiatives

**Registrar’s Office**

Snell, Lower Level
(541) 885-1300
registrar@oit.edu
www.oit.edu/registrar

Major functions of the Registrar’s Office are the maintenance of student records, registration, Web services, grade processing, transfer credit evaluation and community college articulation, degree checking, graduation, scheduling, veterans’ services, enrollment certification and the catalog.

**Academic Information**

The class schedule, introductory pages to the Class Schedule and General Catalog contain information about academic regulations, registration instructions and college procedures and policies. Students should be familiar with this information. These documents can be found on the Oregon Tech Web site at www.oit.edu/registrar.

**Student Records**

The Registrar’s Office maintains information regarding academic progress, including grade reports and permanent academic records (transcripts). Students and alumni may request transcripts at any time.

The Registrar’s Office also collects and maintains accurate information about students, such as address, curriculum (major) and advisor’s name. Much of this information is required for local and state enrollment reporting and for accurate mailing addresses. Changes to personal data such as address or name should be reported to the office promptly.

**Privacy Rights**

Under the Family Educational Rights and Privacy Act of 1974, students are entitled to review records, files, documents and other materials that contain information
Athletics, Recreation and Fitness

(541) 885-1634
www.oit.edu/athletics

The mission of the Oregon Tech Athletic Department and the Tech Fit Center is to facilitate growth and development of students. The department provides a broad-based athletic program that creates educational opportunities through the medium of competition at the collegiate level as well as the opportunity to benefit personal health and fitness to the campus community through the Tech Fit facilities and educational classes. Oregon Tech’s Athletics, Recreation and Fitness Education Center has many facilities, fitness and education opportunities. An expansion off the front of the center provides students with a larger cardiovascular workout area. A free-weight room stocked with all the needed equipment is located downstairs on the east side. A new eight-lane, 400-meter, all weather surface track and turf field was added this past spring and a lighted basketball court offers more outdoor recreation. Also, watch for a lawn volleyball net as it tends to move around campus. Oregon Tech competitive athletics teams include men’s and women’s basketball, cross country, soccer, golf and track and field; women’s volleyball, women’s softball and men’s baseball. Tech also supports men’s and women’s Rugby programs as extramural sports.

The Tech Fit Center, Athletics, Intramural Sports and Extramural Sports are funded by sales revenue (tickets, concessions, camps etc.), Incidental Fees, Oregon State Lottery funds, State General Appropriations and contributions from the community through the Oregon Tech Foundation.

Competitive Athletic Teams

The Oregon Tech Athletic department is dedicated to preparing our student-athletes for professional and personal success in the real world by learning the values of integrity and excellence on the court, field and in the classroom. To that end, we are committed to field teams with the talent and ability to compete at the top of the Cascade Collegiate Conference, as well as regionally and nationally in the NAIA while representing Oregon Tech with dignity and class. To date, Oregon Tech has brought home four NAIA National Championships in team sports – men’s basketball in 2004, 2008 and 2012 and softball in 2011. The privilege of participation in intercollegiate athletics and dedication to team goals provides a classroom where students may experience the development of skills, sportsmanship, loyalty, self-discipline and responsibility while learning the values of winning, losing and competing. The Oregon Tech athletic program contributes to campus life by providing a focal point for social interaction, leadership development, involvement in peer support groups and entertainment.

Intramural Sports

The Oregon Tech intramural program offers a variety of individual and team events in three divisions: men, women and co-ed. We hope that our program and its diversity will invite each of you to participate in at least one event during the academic year. Call 541-885-1722 for information about intramural sports programs or see the website for rosters and information.

Tech Fit

The Tech Fit Center is free to all Oregon Tech students enrolled in eight or more credits per term. Students taking less than eight credits or community members may sign up in either credit or non-credit classes for a minimal charge. For more information call 541-885-1634.
Campus Life

Campus Life supports the meaningful growth and development of Oregon Tech students throughout the life of their university experience. Through active partnership with our students, opportunities are created for hands-on learning, self-discovery, leadership, teamwork, diversity, community service, and social justice in an environment that is rewarding, energetic and fun. Our goal is to inspire students to discover their unique place in our world.

Campus Life oversees the following resources and areas.

Community Service

Campus Life has information available to connect students to ongoing service projects with local agencies in Klamath Falls. The department also coordinates projects each quarter to take place on campus and in our local community. In addition, we sponsor an annual spring break service trip and take a group of students to serve outside of our local area. The 2014 service trip was to Sisters, Oregon where we worked on a Habitat for Humanity build.

Family Weekend

Family Weekend gives families the opportunity to experience their student’s university life and a snapshot of our community. Activities and events include in-depth campus tours, a student talent show, senior project symposium, and club displays and demonstrations. Each year we also partner with the community to provide discounts at local businesses and hotels, as well as tours of Klamath Falls.

Leadership Development

In addition to taking on leadership roles with student organizations, student can gain leadership experience through the LEADERSHIP ACADEMY, which includes a variety of workshops sponsored by departments across campus each term. The workshops are free and open to all students, and participants can receive a variety of incentives for reaching different achievement levels.

Multicultural and International Student Services

Multicultural and International Student Services serves as a resource for minority and international students and staff, including international student orientation and advising (personal/academic/social); F1 visa compliance; SEVIS; OUS Study Abroad Program; and support to cultural organizations and clubs.

New Student Orientation

New Student Orientation (NSO) is held each year during the week preceding the start of fall term classes. It is designed to help new students acclimate to Oregon Tech, meet their fellow students, and feel ready for the start of a successful year. Students who come to orientation receive Oregon Tech gear, free meals, and the chance to win great prizes while learning all about being an Oregon Tech Owl!

Campus Life also hosts New & Transfer Student Orientation during the Winter and Spring quarters, which take place one evening during the first week of classes each term.

Student Programs and Campus Clubs

Student clubs and organizations add another important dimension to life on campus. ASOIT funds approximately 50-60 student organizations and clubs each year. Almost half of the clubs are related to various academic disciplines and provide opportunities for students to meet, study, and take part in professional development opportunities such as conferences and competitions related to their majors. Clubs and organizations also work together to support service learning by participating in a variety of community service projects at home and abroad. Clubs are also linked to special interests, sports, recreation, and cultural, spiritual and social activities.

In addition, there are ten student programs, which are larger student organizations that exist to provide resources to a specific constituency of students. Student Programs have office space on campus, paid student leader positions, and a budget allocation each year. The student programs include:
ASOIT (Student Government)

www.oit.edu/asoit

The purpose of the ASOIT is to supplement the social, cultural, physical, and educational interests in its members, and to represent the individual and collective interests of the students of Oregon Tech. The membership consists of all admitted students at Oregon Institute of Technology currently holding a current, valid student ID card.

Campus Activities Board

www.oit.edu/campusactivities

The purpose of the Campus Activities Board (CAB) is to provide quality activities for all students, taking into consideration their expressed wishes, interests, and needs. CAB provides quality social, cultural, arts and recreational programs for all Oregon Tech students.

Diversity Center

www.oit.edu/dc

Here at Oregon Tech, we are committed to fostering a safe and welcoming campus for all students, faculty, and staff by increasing understanding, sensitivity and awareness to diversity. The Diversity Center (DC) supports these efforts by coordinating programs such as cultural hours, special events, discussions, films and other educational programs. Activities range from cultural exchange presentations and celebrations to workshops and training on a variety of diverse topics. The DC student lounge provides a comfortable atmosphere where students can gather as well as study. Student-use computers, internet access, a large screen TV, kitchen and social area are available. Everyone is welcome.

Outdoor Program (OP)

www.oit.edu/op

The Oregon Tech Outdoor Program (OP) is a student-funded and student-led organization that allows students to enjoy fun activities and beautiful scenery that surrounds them for an extremely low & reasonable price!

- Skiing/Snowboarding trips
- Mountain Biking
- Hiking
- Backpacking
- Fishing
- Skydiving
- White Water Rafting
- Snowshoeing
- Camping
- Hot Springs
- Theme Park trips
- Lava Bed Caving (Spelunking)
- Mountain Climbing
- Rock Climbing
- Canoeing

In addition to sponsoring trips the OP also offers low-cost rental equipment for a variety of outdoor activities.

Residence Hall Association (RHA)

www.oit.edu/rha

Each student living on campus is automatically a member of the Residence Hall Association. The organization works with Residence Life staff to promote, organize, and implement programs and activities for on-campus students. Throughout the course of the year, RHA sponsors events and activities to provide social, cultural and educational enrichment. RHA also serves as a liaison to convey resident concerns related to housing, food service and development programs for students in order to provide an educational environment that maximizes opportunities for student growth, development and equal access to education.

Oregon Tech Veterans Association (OVA)

www.oit.edu/ova

The members of the OVA are dedicated to satisfying the needs of any veteran of the Oregon Tech and KCC community during and after their time as a student, staff, or faculty. OVA reaches out to the greater Oregon Tech and Klamath community and seeks ways of building friendships and partnerships that are based on the same honor, duty, loyalty, and selfless service instilled in all veterans.

Women’s Resource Center

www.oit.edu/women

Community • Outreach • Education • Support.

Acknowledging the complexities of women’s identities, the WRC facilitates choices and change through programs, counseling, and workshops, and serves as the central resource for educational and supportive services for women. The Center is coordinated by a team of Oregon Tech students focusing on healthy relationships, stress management, leadership, networking and professional development. The inclusive environment of the WRC offers a place to study, meet others and participate in events scheduled throughout the year.
Housing and Residence Life

Housing Office Residence Hall, A 151
(541) 885-1094
housing@oit.edu
www.oit.edu/housing

Housing and Residence Life encourages self-responsibility, a necessary ingredient for the accomplishment of academic, social and personal objectives. Accordingly, every attempt is made to provide the environment to accomplish this aim. Studies have indicated that much of the knowledge required for success in life is gained outside the classroom. Oregon Tech's Housing and Residence Life program provides a vital aspect of a student's educational experience. Emphasis is on providing accommodations that are attractive, safe, reasonably priced and that offer stimulating programs that satisfy individual needs for privacy, community life, diversity in living arrangements and educational growth. In the Housing Office, students can make arrangements for a room, receive assistance with personal matters, consult with staff, make suggestions for improvements, work out financial details and receive assistance for a variety of housing related concerns and interests.

Residence facilities at Oregon Tech are operated on a self-supported financial basis and house up to 750 male and female students. Living in college housing relieves the student of many time-consuming and expensive tasks, including driving to and from campus. With this extra time and financial savings, students are able to devote more energy to their studies, to participate in non-academic learning experiences, to enjoy recreational and stress-relieving pursuits and to make new and often lifelong friends.

Information about on-campus housing is sent to all students admitted to Oregon Tech. Students living on campus for the first time must sign up for the meal plan. If you need a housing or meal plan application, please visit our webpage at www.oit.edu/housing and click on Apply Now!

Applications for on-campus housing should be completed and returned as soon as possible to the Housing and Residence Life Office. Space is guaranteed to new students who apply before May 1 for the following academic year.

Room-and-Board Rates
Room-and-board rates at Oregon Tech are announced publicly after university approval. Current rate information and any other information concerning Housing can be obtained from the Housing and Residence Life Office, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801, or online.

Student Media

The EDGE - Student Newspaper
http://ottheedge.com/
Oregon Tech's student newspaper, The Edge, is a weekly publication written by students from all majors and produced by a student staff. Published fall, winter and spring terms, it is available online, with The Ledge (annual satirical issue) distributed in printed format. Academic credit is also available by enrolling in journalism courses.

KTEC Campus Radio Station
www.oit.edu/ktec
89.5 FM
Request Line: 541-885-1648
Having hit the milestone of their 60th year of operation in the spring of 2012, KTEC is the campus radio station and is the oldest FM station in Southern Oregon. KTEC is operated by student staff and volunteers and programmed to serve the interests of the Oregon Tech student body and the Klamath Falls community.

Oregon Technical Broadcasting (OTB)
www.oit.edu/otb
OTB is the student-run video production program at Oregon Tech. OTB films campus events, creates a video-blog series, and provides video services to campus organizations upon request.
University Services

Bookstore, Tech Nest

College Union, 1st Floor
(541) 885-1050
bookstore@oit.edu

The Tech Nest is a full-service campus store. Besides traditional new and used textbooks and course packs, the Tech Nest offers students the option to rent their textbooks or choose from a variety of digital text options. At the end of each term, the store has a book buy-back program allows students to sell back books they do not wish to keep after taking a course.

In addition to course related text and supplies, The Tech Nest carries a wide variety of contemporary items: school, office and residence hall supplies; scientific calculators; writing instruments; emblematic clothing and gifts; computer supplies; software and general reading books. If something is out of stock, the staff can always special order it in store. And online ordering is available 24/7 through the website www.oregontechshop.com. The website also features an expanded apparel, gift and supply selection.

Mailing supplies such as stamps and packing material may be purchased at the Tech Nest, and packages can be shipped via Federal Express from the store.

Campus Dining

College Union, 2nd Floor
(541) 885-1076
www.oit.edu/dining

Dining services, provided by Sodexo Inc., offer a dining program complete with services in several locations across campus, and menu selections that include just about every item you can imagine.

The Marketplace features a wide variety of fresh food designed to satisfy everyone's appetite with food choices to rival restaurant favorites. The Bistro is a quick-serve coffee/ espresso and light meals venue located on the first floor of the College Union. Hootie's, located in the DOW building, and Duffle's, located in the Purvine building both offer a variety of fresh items to get you going in the morning or for a quick pick-me-up between classes. The Night Owl, the residence hall snack bar, is open only at night and offers a selection of beverages and snacks to satisfy that late night hunger.

Career Services

Learning Resource Center 228
(541) 885-1020
career@oit.edu
www.oit.edu/career-services

The Career Services Office supports student and alumni efforts to develop and achieve career goals. Services include: individual career advising; workshops and classroom presentations on résumé-writing, job inter-viewing, job search and applying to graduate school; on-campus employer recruitment, whereby companies and government agencies interview students for career and internship opportunities; Career Fairs, which bring employers and students together on campus to discuss career opportunities informally; career-resource materials and job listings; and a résumé referral service, which supports student applications for employment and graduate school.

Career Services also coordinates the Student Employment Service, which provides part-time employment for students both on and off campus with local employers. Positions are available through the College Work-Study program or through regular employment.

Disability Services

Learning Resources Center 222
(541) 851-5179
(541) 885-1072 Text Telephone
access@oit.edu
www.oit.edu/ds

The Office of Disability Services coordinates academic, housing and program services accommodations for students with documented physical, learning, sensory, psychiatric and other disabilities. Students with disabilities who anticipate needing services on campus should contact this office well in advance of attendance at Oregon Tech to arrange for timely services.
Document Resource Center

College Union, 1st Floor
(541) 885-1059
servicecenter@oit.edu

The DRC is a one-stop shop for printing and bulk mailing needs. Services are available to faculty, staff and students.

Information Technology Services

Bovin Hall
(541) 885-1720
(541) 885-1470 Helpdesk/Service
(503) 821-1289 Wilsonville Helpdesk

Information Technology Services provides computing and telecommunications resources for the Oregon Tech campuses. Primary service and support areas include e-mail and network storage for all students, faculty and staff; broadband network connectivity between all Oregon Tech buildings; and advanced technology services such as wired and wireless Internet connections, Internet 2 and interactive videoconferencing. In conjunction with Oregon Tech faculty, staff and students, ITS strives to offer the comprehensive and advanced technologies necessary to meet educational needs and to help facilitate instruction and research on the Oregon Tech campus.

Integrated Student Health Center (ISHC)

(541) 885-1800
(541) 885-1866 Fax
health@oit.edu

The Integrated Student Health Center, located at the main campus in Klamath Falls, provides general medical care for illnesses and accidents, medical referral, counseling and wellness programs. Students taking six or more on-campus credit hours pay the annual Student Health fee, which covers most services offered by the clinic (including counseling, medical appointments, and a variety of other services). Students with less than six credit hours can utilize ISHC services by paying the student health fee.

Health Requirements to Register

The following health requirements must be fulfilled before registration. Documentation of requirements must be submitted to the Oregon Tech ISHC. Failure to complete these requirements will result in a “health hold” on the student’s account, affecting a student’s ability to conduct Business Office transactions and to register for courses.

1. Completed Health History and TB Risk Assessment forms. These forms are mailed to all students when they confirm registration.

2. Evidence of adequate immunizations (e.g., official immunization record, signed statement by a physician, immunizations on official high school transcript, etc.) including:
   - Two doses of measles/mumps/rubella vaccine (MMR) are required for all full-time college students born on or after Jan. 1, 1957. The first dose must be given after the first birthday. The second dose must be given after 1989.*
   - Recent Tdap (tetanus/diphtheria/pertussis), hepatitis A/B, polio, varicella (chickenpox), HPV (Human Papillomavirus Vaccine), influenza, and meningococcal vaccines. The ISHC can administer most of these vaccines for a small fee.

   * This requirement is supported by: Oregon Administrative Rule 333-050-0130 and the American College Health Association Guidelines: Recommendations for Institutional Prematriculation Immunizations, April 2014.

Medical Clinic Services

Oregon Tech’s ISHC health care providers are committed to providing high quality, personalized care. The medical clinic is staffed by a physician, advanced practice nurse, registered nurse, psychiatric nurse practitioner, and a massage therapist. Diagnosis and treatment of acute and chronic illnesses; gynecological exams, birth control and emergency contraception; routine laboratory procedures; immunizations; wart removal; minor surgery; and care of minor injuries are some of the services provided. Major emergencies are referred to Sky Lakes Medical Center adjacent to the Klamath Falls campus. Referrals are made to specialists as needed. Visits are free with low costs for medications, laboratory work, immunizations, and some treatments.

Counseling Services

Counselors are available to discuss personal, academic and career concerns. Crisis services are available and referrals are made to community resources if needed. Sessions are confidential and are provided free of charge to students enrolled for six or more on-campus credits. Students enrolled for five or fewer credits can receive one free assessment session, and then may access additional services by paying the Student Health fee.

Personal counseling focuses on concerns such as self-esteem, relationship issues, academic performance, family difficulties and troubled sleep. Some specific issues dealt with are: depression; anxiety, substance abuse, suicide, conflicts with parents, spouses or children; loneliness; dating problems; study skills; coping with past or present abusive situations; and grief. Testing is also available for
Learning Disabilities and Attention Deficit Hyperactivity Disorder for additional fees.

**Wellness Programs**
A Health Educator is on staff to assist students in staying healthy and fit while attending Oregon Tech. Free individual appointments are available for personalized health and fitness programs, BMI testing, nutrition education and smoking cessation. Awareness events and health promotion programs are also provided on a regular basis campus-wide. Please call the ISHC to make an appointment or learn more about various campus-wide wellness activities.

**Student Health Advisory Committee (SHAC)**
SHAC serves as an advisory committee to the ISHC. Students provide input on programs and services provided, generate new ideas and participate in wellness and promotion events. All students are welcome to apply to join this committee. SHAC meets on a monthly basis during the academic school year. Call or visit the ISHC to apply.

**Peer Health Educator Program**
The Oregon Tech Peer Health Education Leadership program gives students the opportunity to develop public speaking, leadership, and public health skills while providing a resource for health information to the Oregon Tech community. The mission of the program is "Helping people make informed, voluntary, health-promoting behavior changes." Student volunteers are called Peer Health Educators (PHEs), who work with peers through education and outreach. They receive training to gain facilitation skills, public speaking experience and knowledge about college health issues. Students in good academic standing and with sophomore status or above may apply during Winter Term. Opportunities for others to volunteer and assist PHEs are available throughout the year. For more information, visit www.oit.edu/health/peerhealthed.

**Fees/Charges**
As indicated previously, students taking six or more on-campus credit hours pay an annual Student Health fee. This fee entitles students to services offered by the medical clinic, counseling and wellness programs. Other students can use the center if they pay the health fee. Office visits are free for illness and injury, evaluation, treatment, questions and other reasons. However, additional charges may be necessary for medications, treatments, supplies, immunizations and laboratory tests. Costs for these services and supplies are kept well below the market price for student affordability. No cash is necessary at the time of visit. All medical expenses rendered outside the ISHC from private physicians, laboratories, or hospitals are the student’s financial responsibility.

**Student Health Insurance Plan (SHIP)**
Purchasing Oregon Tech student health insurance is on a voluntary basis. If you do not have health insurance from an alternative source, you are strongly encouraged to look at purchasing the voluntary health insurance plan. International students and students in certain programs/externships will continue to have to meet requirements for health insurance through a hard waiver. The waiver must be completed within the first 14 days of a term before a refund can be given. Once completed, the waiver will cover the entire academic year. Students taking six or more on-campus credit hours (who pay the Student Health fee) remain eligible for services at the ISHC, even if the SHIP is waived.

**Library Services**
(541) 885-1772  
www.oit.edu/libraries

The University Libraries consist of the Klamath Falls library located on the first and second floors of the Learning Resources Center building on the Klamath Falls campus, the Shaw Historical Library located on the second floor of the LRC, and the Wilsonville library located on the fourth floor of the Wilsonville campus building. Online catalogs provide access to the collections of the University Libraries, while web-based databases offer students access to extensive information sources. All electronic resources are available on both campuses and via remote access in order to promote student learning regardless of location. Research services include print and electronic reserves, interlibrary loans, individual research assistance, and chat reference. Campus librarians offer class-related instruction in the use of the library and information resources, workshops on various topics, classes in research methods, and tours of library facilities.

**Klamath Falls Library**
The Klamath Falls library contains approximately 150,000 volumes, including government documents; access to more than 18,000 print and electronic journals; and unique digital and special collections. For librarian assistance, call 541-885-1772 or email libtech@oit.edu.

**Wilsonville Library**
The Wilsonville library houses a print collection on-site focusing on local programs, and will request any other resources as needed. For assistance call 503-821-1260 or email libtech@oit.edu.

**Shaw Historical Library**
The Shaw Historical Library, established in 1983 by Laurence and Dorothy Shaw, houses books, art, maps, manuscripts, photographs, and other materials on the history, cultures and natural history of the Land of the Lakes—South Central Oregon, Northern California, and Northwestern Nevada. The Journal of the Shaw Historical Library is available for purchase at the Oregon Tech bookstore. For more information call 541-885-1686 or email Shawlib@oit.edu.
Student Success Center (SSC)

Learning Resource Center, 2nd Floor
(541) 851-5179
ssc@oit.edu
www.oit.edu/ssc

The Student Success Center (SSC) is a multi-purpose department designed to enrich learning, teaching, and student success at Oregon Tech. The SSC consists of Testing, Peer Consulting (Tutoring), TOP, Breakfast Club, Disability, and Career Services. The SSC helps students succeed by providing effective academic assistance, support, and resources through promotion of student learning, personal growth, and programs designed to enhance instruction, advising, involvement, satisfaction, achievement, retention, persistence, graduation, and post-graduate success. The SSC provides peer tutoring for matriculated Oregon Tech students, academic success (ACAD) classes, accommodations for students with disabilities, test proctoring, the campus writing center, as well as many other services to support students, staff, and faculty in an effort to facilitate student success at Oregon Tech. In addition, the SSC assists with faculty orientation, support, and development efforts, including September Institute and Advisor Training for new faculty. The SSC also functions as the University Testing Center by offering testing, distance testing, placement testing, test proctoring, and other standardized testing programs.

The SSC is an integral part of Oregon Tech’s student success initiatives and strives to provide effective programs and services to create a welcoming, supportive, and successful campus.

Tech Opportunities Program

Learning Resource Center 228
(541) 885-1125
TOP@oit.edu
www.oit.edu/TOP

The Tech Opportunities Program (TOP) is a federally funded (Student Support Services TRIO) academic support program designed to assist highly motivated students who are also low income, first generation or students with disabilities. TOP staff work closely with participating students to comprehensively assess academic and financial needs and to develop personalized plans for college success.

Participants may be eligible for a variety of academic support services, including group and/or individual tutoring and related support; mentoring; networking with other students; college-success workshops and classes; additional academic advising; and limited financial assistance.
University Development

Snell 213  
(541) 885-1130

The University Development Department is charged with providing financial support of Oregon Tech’s mission by connecting donors, alumni, and friends with philanthropic opportunities at the university in partnership with the Oregon Tech Foundation. University Development works to build positive relationships with students, faculty, staff, alumni and friends of the university to enhance and create opportunities that foster a tradition of philanthropic support. University Development engages in initiatives and activities that embody institutional values and position Oregon Institute of Technology among the nation’s leading technological and health professions universities. Fundraising, alumni relations, community outreach and other activities serve to promote the distinctive role and numerous educational, research and public service contributions of Oregon Tech throughout our communities, the nation, and internationally.

The Oregon Tech Alumni Association

(503) 821-1145  
alumni@oit.edu  
https://alumni.oit.edu

The Alumni Relations office promotes interactions and loyalty of alumni and currently enrolled students toward Oregon Institute of Technology. Services and activities include regional social events, student activities, reunions and continuing education programs. Alumni have the opportunity to keep in touch with other alumni through the university’s alumni Web page and other means of communications regarding their academic major and Oregon Tech.

The Oregon Tech Alumni Association, established in 1949, is guided by the Alumni Advisory Board and exists to support and promote Oregon Tech as a premier learning institution and to provide a structure for alumni affiliation. Membership is free and automatic to anyone who has completed at least 90 credits at Oregon Tech. Areas of special interest for the Alumni Association include assisting the university with new-student recruitment activities, career networking, social and educational activities and the financial support of Oregon Tech. The Alumni Association is an affiliated organization of the Oregon Tech Foundation.

The Oregon Tech Foundation

Snell 212  
(541) 885-1130

The Oregon Tech Foundation was established to support the educational, cultural, charitable, and service activities of Oregon Institute of Technology through philanthropic support. Established as a 501(c)(3) tax-exempt organization, the Foundation is a separate legal entity from the University and is the designated charitable arm of the University. The Foundation is governed by a Board of Directors that represents a broad range of community leaders, alumni and private benefactors. The Foundation board of directors is tasked with management and growth of the assets of the Foundation and for participating in fundraising efforts of Oregon Tech.

The Foundation has enriched the University and student life by combining their efforts with the Oregon Tech administration and community leaders to accomplish some of the most notable projects on campus:

- Martha Anne Dow Center for Health Professions
- Jesse A. Crabtree Civil Engineering Learning Plaza
- Danny Miles Court floor and scoreboard replacement
- Shaw Historical Library
- John F. Moehl football stadium

On average, the Foundation provides approximately $1 million to Oregon Tech, a large part of which is committed to the support of numerous scholarships that are awarded primarily on the basis of academic achievement and financial need and for academic excellence.

The Foundation works closely with its affiliated organizations, including the Oregon Tech Alumni Association and the Shaw Historical Library.
Geo-Heat Center
Boivin Hall, 102
(541) 885-1750
geoheat@oit.edu
http://geoheat.oit.edu

The Oregon Renewable Energy Center encompasses Oregon Tech’s Geo-Heat Center. Established in 1975, Geo-Heat is active in research, technical assistance and information services in geothermal direct-use, small-scale power generation and ground-source heat pumps. Research activities have included hydrology and geochemistry studies, district heating, downhole heat exchangers, heat pumps, agri-business applications, low temperature Rankine cycle power generators and resource assessment.

As funding allows, the Center provides technical assistance for geothermal projects in the area of equipment and materials selection, feasibility studies, design, troubleshooting and economic evaluations. The Center also provides training sessions and information dissemination regarding the direct applications of geothermal energy, small-scale power generation and ground-source heat pumps.

The Center also publishes technical papers, software and monographs on geothermal energy. Most publications are available on the Center’s website, and also through the National Geothermal Data System (NGDS). Archival publications are available through Oregon Tech’s library system. The staff has made presentations worldwide and gives tours of local geothermal installations. They are active in professional organizations such as the Geothermal Resources Council, the International Geothermal Association, International Ground-Source Heat Pump Association, and ASHRAE. An extensive Web site on geothermal energy is available at: http://geoheat.oit.edu.

Oregon Renewable Energy Center

The Oregon Renewable Energy Center (OREC) was established by the Oregon State Legislature in 2001 to promote energy conservation and renewable energy use in Oregon and throughout the Northwest. This is accomplished through applied research, educational programs and workforce development, and technical assistance and information dissemination. The Center also encompasses Oregon Tech’s Geo-Heat Center. OREC draws its strong technical expertise from the Oregon Tech faculty, whose engineers and computer scientists have been involved in applied research in renewable energy for decades.

OREC:
• Investigates renewable energy technologies and opportunities for using them.
• Assesses which technologies are appropriate for particular circumstances.
• Applies promising technologies with effective instrumentation and controls.

• Evaluates technologies using testing and economic analysis.
• Supports Curriculum Development and student learning experiences.
• Informs the public through classes, educational materials, and technical data.

Current OREC applied research and applications engineering projects focus on:
• Power conversion and storage – Testing renewable technologies such as solar, fuel cells, and geothermal heat pumps and developing control systems to smoothly integrate renewable technologies into existing facilities and electrical distribution networks.
• Alternative fuel sources – Investigating electric and biodiesel power options for cars and trucks.
• Green building technologies – Utilizing green building materials and techniques, and instrumentation, control and testing of buildings that use renewable energy instead of conventional power.
• Grid integration of renewable energy sources (smart grid with smart buildings)

Renewable Energy Engineering (REE) Degree Program
The Renewable Energy Engineering undergraduate degree program offered by Oregon Tech is the only one of its kind to be ABET accredited. We now also have an MS REE degree. In addition to the REE courses, the general Oregon Tech curriculum includes classes and laboratories in renewable energy and sustainability that are available to students in other disciplines. The BS REE is delivered on both the Wilsonville and Klamath Falls campuses. The MSREE degree is delivered only on the Wilsonville campus.
Youth and High School Programs

www.oit.edu/youth-programs

Oregon Tech’s Youth Programs offers innovative and energizing pre-college educational outreach programs designed to encourage K-12 students to pursue educational and career goals in science, technology, engineering and mathematics (STEM). The goals of our programs are to:

1. Increase understanding and interest in STEM careers among participants;
2. Build confidence in their technical abilities; and
3. Introduce them to role models and mentors.

Youth Camps

GEAR UP
A series of special programs, created in partnership with Oregon GEAR UP, to ensure that Oregon’s low-income middle school and high school students are prepared for, pursue and succeed in post-secondary education.

I’m Going To College
In partnership with NELA, this day program brings sixth-grade students to campus to expose them to college. The students attend classes, tour Oregon Tech, and have lunch. A follow-up meeting with parents will be hosted by students’ elementary schools.

MATHCOUNTS
An annual competition in February that challenges students’ math skills, develops their self-confidence and rewards them for their achievements. Open to sixth-, seventh- and eighth-grade students in the Klamath Basin, this program gives students the opportunity to participate in individual and team competitions. The top students advance to the state and national levels.
Directories

Governance Oregon University System

Since its founding in 1947, the Oregon Institute of Technology was governed by the Oregon State Board of Higher Education, the governing board for the seven public universities in Oregon. In April 2014, the State Board of Higher Education authorized the Oregon Institute of Technology to establish a Board of Trustees, appointed by the Governor and approved by the Senate, without conditions.

Effective July 1, 2015, the University became an “independent public body” governed by the Board of Trustees with every authority necessary or appropriate for the operation of a major public research university. The Oregon Tech Board of Trustees will approve the University’s mission, programs, budgets, and strategies, and then forward them to the Higher Education Coordinating Commission for review and approval in relation to the other seven publicly-assisted universities.

Oregon Tech Board of Trustees

Members and term expiration dates:

- Jeremy Brown, 2018
- Melissa Ceron, 2016
- Jessica Gomez, 2016
- Lisa Graham, Chair, 2018
- Dana Henry, 2016
- Kathleen Hill, 2018
- Gary Johnston, 2018
- Christopher Maples, ex-officio
- Kelley Minty Morris, 2018
- Celia Núñez, 2018
- Dan Peterson, 2016
- Steve Sliwa, Vice-Chair, 2018
- Paul Stewar, 2018
- Fred Ziari, 2018

Administrative Offices

**President**, Christopher G. Maples

**Provost and Vice President for Academic Affairs**, Brad Burda

**Vice President for Finance and Administration**, MaryAnn Zemke

**Vice President for Student Affairs and Dean of Students**, Erin Foley

**Associate Provost and Vice President for Research**, Mateo Aboy

**Associate Vice President and Chief Information Officer**, Paul Rowan

**Associate Vice President for Communication and Public Affairs**, Di Saunders

**Associate Vice President for Strategic Partnerships**, Dolores “Lita” Colligan

**Associate Vice President for University Development**, Tracy Ricketts

**Dean, College of Engineering, Technology and Management**, Vacant

**Dean, College of Health, Arts and Sciences**, LeAnn Maupin

**Academic Agreements**, Marla Edge, Director

**Admissions**, Carl Thomas, Director

**Assessment**, Sandra Bailey, Director

**Athletics**, Mike Schell, Director

**Board Secretary**, Oregon Tech Board of Trustees, Sandra Fox

**Business Affairs**, Michelle Meyer, Director

**Campus Life**, Joseph Maurer, Director

**Campus Security**, Ed Daniels, Director

**College Union**, Shellie Wilson, Manager

**Facilities Management and Planning Services**, Vacant

**Financial Aid**, Tracey Lehman, Director

**Housing and Residence Life**, Mandi Clark, Director

**Human Resources and Affirmative Action**, Ron McCutcheon, Director

**Institutional Research**, Vacant

**Integrated Student Health Center**, Gaylyn Maurer, Administrative Director

**Library Services**, Kelly Peterson-Fairchild, Director

**Online Learning**, Erika Veth, Director

**Oregon Renewable Energy Center**, Vacant

**Procurement, Contracts and Risk Management**, George Marlton, Executive Director

**Registrar’s Office**, Wendy Ivie, University Registrar

**Seattle at Boeing**, Vacant

**Student Success Center**, Dan Ziriax, Director
Oregon Tech Foundation Board of Directors

Diedra Thompson, President
James Blair, Vice President
Andrew Peterson, Treasurer
Kristi Redd, Secretary
Mark Bansemer
Lance Bishop
Don Boyd
Gregory Bulkley
Larry Claussen
Gerald Freschi
Geri Da Hyde
Gary Johnston
Douglas Kintzinger
Trevor Mauch
Robert Neathamer
Richard Siemens
Lois Stilwell
Theodore Thom
Jon Wayland
Donald Young

Emeritus Directors
Timothy Bailey
Marge Bocchi
R. Sherrill Boyd
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Dave Cowan
Alan Craigmiles
William Early
Trudy Farr
Fred Foulon
John Gerbert
Winifred Hood
Susan Laubengayer
James McCobb
John Novak
Jean Pinninger
Joan Staunton
Nancy Wendt

Ex-Officio
Christopher Maples, Oregon Tech President
Mary Ann Zemke, Oregon Tech Vice President for Finance and Administration
Raphael Santiago, Oregon Tech Alumni Advisory Board President
Steve Kandra, President, Shaw Historical Library

President’s Advisory Council

Cecelia Amuchastegui, Educational Consultant, 2016
Dianne Appell, Engineering Senior Manager, The Boeing Company, 2017
William Buckley, Attorney at Law, Buckley LeChevallier P.C., 2018
Adam Burwell, Entrepreneur/Consultant, 2018
Ann Cavanaugh, Vice President, Smith Bates Marcomm Solutions, 2016
James DeHoog, President, Arctic Engineering, Inc., 2018
Lisa Graham, Vice President and COO, Bend Research, Inc., 2015
Daniel M. Hallesy, Ultrasound Sales Manager, Esaote North America, Inc., 2017
Denise Honzel, Healthcare Consultant, 2016
Sally Jones, Community Member, 2018
Jill Mason, Dental Hygienist/Education, Oregon Health & Science University, 2018
Steven Mays, President, Electronic Wood Systems, Inc., 2018
Kelley Minty Morris, Outreach and Development, Citizens for Safe Schools, 2016
Carla Mc Kelvey, MD, MPH, North Bend Medical Center Pediatrics, 2018
Patricia Smullin, President, California-Oregon Broadcasting, Inc., 2018
Paul Stewart, President and CEO, Sky Lakes Medical Center, 2015

Steve Vincent, Regional Business Manager, Avista, 2015
Heidi Wright, President and Publisher, Klamath Publishing LLC/Herald and News, 2017
Robert Wynne, President and General Manager, Wynne Broadcasting Company, 2016
Administration

Jan Abeita (2005), Access Services Manager, Library Services. B.S. (1990), Eastern Oregon University; M.S. (1992), Southern Oregon University


Holly Anderson (2012), Assistant Director-Campus Visits and Programs, Admissions. B.S. (2008), Warner Pacific College.

Diana Angeli (2006), Executive Assistant, Vice President, Finance and Administration.

Angela Archer (2010), Coordinator, Tech Opportunities Program. B.S. (2009), Oregon Institute of Technology.


Carrie Blomquist (2014), Online Faculty Support Specialist, Online Learning, B.S. (2009), Oregon Institute of Technology; M.B.A. (2013), Southern Oregon University.

Brad Burda (1983), Provost and Vice President, Academic Affairs. B.S. (1972), Iowa Wesleyan College; M.A. (1982), California State University, Long Beach.

Kelly Caleb (2007), Athletic Trainer, Athletics. A.S. (1996), Oregon Institute of Technology; B.S. (1999), Oregon State University; M.S. (2015) Capella University, Katie Cavendish (2015), Executive Assistant to Associate Vice President, Development


Mandi Clark (2004), Director, Housing and Residence Life. B.A. (1997), Kansas State University; M.S. (1999), University of Nebraska.


Dolores “Lita” Colligan (2007), Associate Vice President, Strategic Partnerships. B.A. (1975), University of California, Santa Cruz.


Chris Cook (2014), Grounds Supervisor, Facilities Management Services


Edward Daniels (1988), Director, Campus Safety


Melissa Dubois (2014), Director, South Metro-Salem STEM Hub. B.S. (1999), Northeastern University; Ph.D. (2005), University of Wisconsin.

Marla Edge (1983), Assistant Professor; Director, Academic Agreements. B.S. (1976), M.Ed. (1989), Oregon State University.


Erin Ferrara (2014), Disability Services Coordinator, Student Success Center


Sandra Fox (2014) University Board Secretary.

Michelle Frei (2013), Counselor, Financial Aid.

Michael Garrard (2007), Coordinator of Sports Marketing/Promotion, Athletics.

Alden Glidden (1978), Associate Professor; Medical Director, Student Health Center. B.S. (1965), University of Michigan, Ann Arbor; M.D. (1969), Wayne State University.


Jan Goodyear (1999), Career Advisor, Student Success Center


Michael Healy (2013), Lab Manager, CSET.


Tracie Houtz (2013), Associate Director, Human Resources. B.S. (2007), Eastern Oregon University.

Trish Hower (2009), Executive Assistant, Vice President for Research/Associate Provost. B.A. (2004) Oregon State University


Wendy Ivie (1999), University Registrar, Registrar's Office. B.S. (1997), Oregon State University; M.S. (2005), Southern Oregon University.


Jennifer Kass (2015), Associate Director-Career Services, Wilsonville

Michal Kawka (2015), Academic Specialist, Student Success Center


Anne Malinowski (1990), Assistant Registrar & Veterans Certifying Official, Wilsonville Operations.


LeAnn Maupin (1997), Dean, College of Health, Arts and Sciences


Daniel Miles (1970), Head Men's Basketball Coach, Athletics. B.A. (1968), Southern Oregon University.


Valjean Newsome (1997), Executive Secretary to Dean of Engineering, Technology, and Management.

Dana Onorato (2013), Director of Student Services, Wilsonville.

Deanne Pandolzi (2002), International Student and Diversity Coordinator, Campus Life and SEVIS. B.S. (2010), Oregon Institute of Technology.


Adria Paschal (2007), Executive Assistant to the President.


Denise Reid (2010), Assistant Director, Business Affairs. B.S. (2008), University of Phoenix; M.S. (2012), University of Phoenix.

Sara Reuter (2009), Director of Sponsored Projects


Tracy Ricketts (2010), Associate Vice President, Development and Alumni Relations. B.S. (1999), University of Oregon.

Paul Rowan (2015), Associate Vice President – Chief Information Officer. A.S. (1973), Foothill College; B.S. (1977), Biola University; M.S. (1991), Ball State University.


Di Saunders (2014), Associate Vice President, Communication and Public Affairs


Nellie Stewart (2007), Executive Secretary to Vice President, Student Affairs. B.S. (2011), Oregon Institute of Technology.

Cynthia Stripling (2013), Office Coordinator, Admissions


Danny Ziriax (2012), Director, Student Success Center. B.S. (1989), Evangel University; M.S.M. (2010), Oral Roberts University.


### Instructional Faculty

This listing reflects faculty for the 2015-16 academic year. In some cases, changes taking effect for 2015-16 are included in the faculty lists under the department descriptions.


Sandra Bailey (2000), Assistant Professor, Management. B.S. (1985), Utah State University; M.Ed (2005), Oregon State University.


Sharon Beaudry (2014), Assistant Professor, Management. B.S. (1985), College of New Rochelle; J.D. (2009), Northwestern California University; M.B.A. (2013), Northcentral University. Senior Professional in Human Resources (SPHR).


Vanessa Bennett (2008), Instructor, Medical Imaging Technology. B.S. (2001), Oregon Institute of Technology; Certified Nuclear Medicine Technologist (CNMT).


Kevin J. Brown (2001), Professor, Communication. A.A. (1986), Ricks College; B.A. (1988), Idaho State University; M.A.
Ben Bunting (2013), Assistant Professor, Humanities and Social Sciences. B.A. (2003), Kent State University; M.A. (2007); Ph.D. (2012), Washington State University.


Kerry M. Byrne (2013), Assistant Professor, Natural Sciences. B.S. (2004), University of California, Davis; Ph.D. (2012), Colorado State University.


Cara Calvo (2012), Assistant Professor, Clinical Laboratory Science. B.S. (1983), Oregon Health and Science University; B.S. (1983), Portland State University; M.S. (1990), University of Vermont; MT (ASCP), SH (ASCP) registered.

Barry Canaday (2009), Assistant Professor, Medical Imaging Technology. B.S. (1968), Oregon State University; M.S. (1973), Western Washington University; A.A.S. (1978), Peninsula College; A.A.S. (1992), Spokane Community College. Registered Nurse (1978); Registered Cardiac Sonographer (A) – (1992) CCI; Registered Diagnostic Cardiac Sonographer (AE) – (1992) ARDMS.

Richard D. Carson (2006), Assistant Professor, Medical Imaging Technology. B.S. (1997), Oregon Institute of Technology; M.Ed. (2012), Western Governors University. Registered Technologist (R) (CT) ARRT.

Christopher L. Caster (1999), Associate Professor, Medical Imaging Technology. A.A. (1975), Oregon Institute of Technology; B.S. (1979), Eugene Bible College; B.S. (1996), Oregon Institute of Technology; M.Ed. (2002), University of Phoenix.

Burton D. Clark (1998), Professor, Natural Sciences. B.S. (1979), University of Massachusetts, Amherst; Ph.D. (1986), The Ohio State University.

Mark H. Clark (1996), Professor, Humanities and Social Sciences. B.S. (1984), Rice University; M.A. (1987), University of Houston; Ph.D. (1992), University of Delaware.


Kate P. Darling (2001), Instructor, Emergency Medical Services, Paramedic Education. A.A.S. (1997), Oregon Health and Science University; B.A. (1976), College of the Atlantic.

Don DaSaro (2010), Assistant Professor, Management. A.S., Metropolitan College, Kansas City, MO; B.S. (1967), University of Missouri; M.B.A. (1991), Marymount University.

Dibyajyoti Deb (2013), Assistant Professor, Mathematics. B.S. (2004), Chennai Mathematical Institute, India; M.S. (2006), University of Kentucky; Ph.D. (2010), University of Kentucky.


Heidi Denton (2008), Instructor, Dental Hygiene. B.S. (1999), Oregon Health and Science University.

Jeff Dickson (2010), Assistant Professor, Management. B.S. (2006), Oregon Institute of Technology; M.B.A. (2012), Southern Oregon University.


Abraham Furman (2001), Associate Professor, Clinical Laboratory Science. B.S. (1970), San Diego State University; B.S. (1972), Loma Linda University; Ph.D. (1980), University of California, Los Angeles. MT (ASCP) registered.


Elizabeth H. Gordon (2006), Assistant Professor, Dental Hygiene. B.S. (2006), Oregon Institute of Technology; M.Ed. (2010), University of Phoenix.


Paula J. Hendrix (2011), Assistant Processor, Program Director (Salem), Dental Hygiene. B.S. (1985), Oregon Health and Science University; M.Ed. (2013), Concordia University.

Evelyn R. Hobbs (2014), Associate Professor, Dental Hygiene. GDH (1964), University of Minnesota; BSDH (1975), M.Ed. (1976), University of Washington.


Alishia Huntoon (2005), Associate Professor, Humanities and Social Sciences. B.S. (1999), University of Wisconsin, Stevens Point; M.S. (2002), Ph.D. (2005), Washington State University.


John D. Jackson (2010), Assistant Professor, Management. B.S. (1978), Baylor University; M.S. (1980), Texas A&M University.


Leah Jolly (2014), Instructor, Medical Imaging Technology. B.S. (2003), Oregon Institute of Technology. Registered Vascular Technologist (RVT) and Registered Phlebology Sonographer (RPhS).


Jherime L. Kellermann (2013), Assistant Professor, Natural Sciences. B.A. (1998), Penn State University; M.S. (2007), Humboldt State University; Ph.D. (2012), University of Arizona.


Maria Lynn Kessler (2002), Professor, Humanities and Social Sciences. B.S. (1983), Northeastern University; M.S. (1989), Southern Illinois University, Carbondale; Ph.D. (1994), Florida State University.

Grant C. Kirby (2003), Associate Professor, Management. B.S. (1987), Oregon Institute of Technology; M.B.A. (1999), University of Oregon; M.S. (2013), Portland State University; Graduate Certificate in Sustainability (2013), Portland State University.


Kristen Konkel (2014), Assistant Professor, Humanities and Social Sciences. B.S. (2009), The University of Akron; M.S. (2013), Colorado State University.

Bobbi Kowash (2010), Instructor, Medical Imaging Technology. B.S. (1999), Oregon Institute of Technology.

University; M.L.S. (1997), Emporia State University.

**Dongbin (Don) Lee** (2013), Assistant Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1992), M.S. (2000), Kwangwoon University; Ph.D. (2009), Clemson University.

**Hui Yun Li** (2006), Professor, Natural Sciences. B.S. (1988), National Taiwan University; M.S. (1990), Michigan State University; Ph.D. (1994), University of Massachusetts, Amherst.


**Dawn Lowe-Wincentsen** (2008), Associate Professor, Wilsonville Librarian, Creative Writing. B.A. (2000), Linfield College; M.L.I.S. (2003), Louisiana State University.

**Travis J. Lund** (2014), Assistant Professor, Natural Sciences. B.S. (2006), George Fox University; Ph.D. (2013), University of Colorado Boulder.


**LeAnn Maupin** (1997), Professor, Medical Imaging Technology. B.S. (1992), Oregon Institute of Technology; M.Ed. (2001), University of Phoenix. Registered Technologist (R, ARRT), Registered Vascular Technologist (RVT).


**Donald McDonnell** (2007), Assistant Professor, Medical Imaging Technology. B.S. (1997), Oregon Institute of Technology; M.Ed. (2012), Western Governor's University. Registered Technologist (R, ARRT).


**Sophia Nathenson** (2012), Assistant Professor, Humanities and Social Sciences. B.S. (2006), University of Tulsa; M.S. (2009), Ph.D (2012), University of Utah.


**Mary “Molly” R. O'Shaughnessy** (1999), Professor, Natural Sciences. B.S. (1978), University of New Hampshire; D.V.M. (1992), The Ohio State University.


**David Panossian** (2007), Medical Director, Respiratory Care and Sleep Health. B.S. (1985), Walla Walla College; M.D. (1989), Loma Linda University.

**Jeffrey Pardy** (2009), Assistant Professor, Respiratory Care and Sleep Health. A.S. (1994), Rogue Community College; B.S. (2001), Regis University; M.B.A. (2012), Southern Oregon University.

**Lloyd Parratt** (2010), Assistant Professor, Natural Sciences. B.S. (1972), University of Redlands; M.S. (1974), University of Wyoming.


**Jane E. Perri** (2000), Associate Professor, Respiratory Care and Sleep Health. B.A. (1975), University of Cincinnati; M.Ed. (1995), Wright State University, Ohio; Ph.D. (2000), The Union Institute and University.

**Trevor J. Petersen** (2013), Assistant Professor, Humanities and Social Sciences. B.S. (2006), Brigham Young University; M.S. (2009), Ph.D. (2013), Ohio University.


Slobodan Petrovic (2009), Associate Professor, Electrical Engineering and Renewable Energy. B.S. (1979), University of Belgrade, Yugoslavia; Ph.D. (1984), Technical University of Dresden, Germany.


Kevin Pintong (2014), Assistant Professor, Computer Systems Engineering Technology. B.S. (2010), Binghamton University; M.S. (2012), Binghamton University.


Scott Prahl (2012), Associate Professor, Electrical Engineering and Renewable Energy. B.S. (1982), California Institute of Technology; Ph.D. (1988), University of Texas at Austin.

Mary D. Prange (2005), Instructor, Dental Hygiene. A.A. (1976), Cerroitos College.


Joseph Reid (2009), Assistant Professor, Mathematics. B.S. (2006), Western Oregon University; B.S. (2008), Oregon Institute of Technology; M.S. (2009), University of Washington; M.A.S. (2013), Penn State University.


Paula Russell (2011), Assistant Professor, Dental Hygiene. B.S. (1998), Oregon Institute of Technology; M.Ed (2010), University of Phoenix.


Patrick Schaeffer (2009), Associate Professor, Management. B.S. (1986), M.S. (1994), San Jose State University.


Aaron Scher (2012), Assistant Professor, Electrical Engineering and Renewable Energy. B.S. (2003), M.S. (2005), Texas A&M University, College Station; Ph.D. (2008), University of Colorado, Boulder.


Matthew Search (2010), Assistant Professor, Communication. M.A. (1999), University of Central Florida; Ph.D. (2010), Iowa State University.


Feng Shi (2011), Assistant Professor, Electrical Engineering and Renewable Energy. B.S. (1985), Northwest Normal University, P.R. China; MME (1991), Yunnan Normal University, P.R. China; M.S. (2002), University of Rochester; Ph.D. (2008), University of Toledo.

Hong “Randy” Y. Shih (1984), Professor, Manufacturing and Mechanical Engineering Technology. B.S. (1979), Chung-Yuan University, Taiwan; M.S. (1984), University of Nebraska, Lincoln.


William J. Stuart (2004), Associate Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1969), University of Nevada, Reno; M.S. (1972), University of Southampton, UK.

Wangping Sun (2005), Associate Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1988), Northern Jiaotong University; M.S. (2002), Ph.D. (2005), Kansas State University.

John-Glen Swanson (2013), Assistant Professor, Manufacturing and Mechanical Engineering and Technology. Dipl.-Ing. (2005), Dr.-Ing. (2011), Clausthal University of Technology, Germany.

Ronald H. Swisher (1976), Professor, Natural Sciences. B.A. (1972), Pomona College; Ph.D. (1976), University of Oregon.


Terri Torres (2008), Associate Professor, Mathematics. B.S. (1981), Brigham Young University; M.S. (1994), Idaho State University; M.S. (2010), Bowling Green State University.

Claudia Torres Garibay (2009), Associate Professor, Electrical Engineering and Renewable Energy. B.S. (1996), Chihuahua Technological Institute, Mexico; M.S. (2000), Advanced Materials Research Center, Mexico; Ph.D. (2007), University of Texas, Austin.


Lawrence J. Wolf (1998), Professor, Manufacturing and Mechanical Engineering and Technology. A.A. (1959), Harris-Stowe State University; B.S.M.E. (1961), M.S.M.E. (1962), D.Sc. (1971), Washington University, St. Louis. Registered Professional Engineer: Oregon, Missouri; Oregon Tech President Emeritus (Designate); Distinguished Service Professor of the Oregon University System.


Sarah Woodman (2013), Assistant Professor, Respiratory Care and Sleep Health. B.S. (2010), Oregon Institute of Technology; M.H.A. (2012), Pacific University.


Gary L. Zimmerman (1995), Professor, Medical Imaging Technology. B.S. (1984), Oregon Institute of Technology; M.S. (1993), University of Wisconsin, Oshkosh. Registered Technologist (R), (MR), (CT), ARRT.

Faculty Senate Presidents

1965-1966  Eugene A. Wellman
1966-1967  Max A. Saunders
1967-1968  Arthur A. LeCours
1968        George E. Miller
1968-1969  Dalhart R. Eklund
1971-1972  Dale W. King
1972-1973  Larsen S. Svevik
1973-1974  Sherman A. Anderson
1974-1975  Thomas J. Connors
1975-1976  James J. Boyle
1976-1977  Joseph T. Riker
1977-1978  Robert C. DeRosier
1978-1979  Richard H. Zbinden
1979-1980  Gary E. Wehr
1980-1981  Keith L. Spickler
1981-1982  Earl D. Kurz
1982-1983  Charles V. Higbee
1983-1984  Charles V. Higbee
1984-1985  Edward Silling
1985-1986  Herbert H. Jolliff
1986-1987  Herbert H. Jolliff
1987-1988  Charles E. Harris
1988-1989  Ross S. Carroll
1989-1990  Pearl O. Juris
1990-1991  John V. Spec
1992-1993  James R. Etchison
1993-1994  Bradley D. Burda
1994-1995  Bradley D. Burda
1995-1996  Valerie J. Vance
1996-1997  Valerie J. Vance
1997-1998  David C. Warner
1998-1999  David C. Warner
1999-2000  Alberto Bello, Jr.
2000-2001  Mark Clark
2001-2002  Mark Clark
2002-2003  Timothy Thompson
2003-2004  Bradley D. Burda
2004-2005  Bradley D. Burda
2005-2006  Bradley D. Burda
2006-2007  Mark Neupert
2007-2008  Mark Neupert
2008-2009  Marla Miller
2009-2010  Debbie Caldwell
2010-2011  Matt Schnackenberg
2011-2012  Matt Schnackenberg
2012-2014  Dan Peterson
2014-Present  Robyn Cole

Emeritus Faculty

Marshall Ager, B.S., Assistant Professor, Civil Engineering and Geomatics, 1977-2004.

Randal Albert, M.S., Computer Systems Engineering Technology, 1984-2013


Judy Bronkey, M.A., Associate Professor, Director, Ethnic and International Student Services, 1969-1995.


Ralph Carestia, M.S., Computer Systems Engineering Technology, 1990-2013

Ross Carroll, Ph.D., Professor of Communication, 1984-2003.

Thomas J. Connors, Ph.D., Professor and Vascular Technology Program Director, 1969-1999.

Harriet Cornachione, M.S., Professor, Civil Engineering, 1995-2010.

Michael Cornachione, M.S., Professor, Civil Engineering, 1992-2010.

Ben Cornelius, M.A., Mathematics, 1980-2013

Jesse Crabtree, Assistant Professor, Civil Engineering Technology, 1947-1976.

G. Gene Culver, B.S., Associate Professor, Associate Director, Geo-Heat Center, 1960-1995.

Hugh Currin, Ph.D., Manufacturing and Mechanical Engineering Technology, 1984-2013

W.M. Douglass, M.Ed., Professor and Dean of Administration, 1954-1983.


David Dyrud, Ph.D., Professor of Communication, 1975-2003.


Marian Ewell, B.S., Assistant Professor, Allied Health Partnerships, Clinical Laboratory Science, 2001-2012.

Jeanne Ford, R.N., Assistant Professor, Administrative Director, Student Health Service, 1964-1983.


Charles C. Glover, B.S., Associate Professor, Diesel Power Technology, 1966-1990.

Harold E. Godfrey, Jr., B.S., Assistant Professor, Medical Imaging Technology, 1975-1997.


Charles E. Harris, M.S., Professor, Department of Extended Studies and Summer Session, 1976-1996.


Margaret Huntley, Professor, Management, 1975-2006.
Herbert H. Jolliff, M.S., Professor and Department Chair, Mathematics, 1968-1999.

Charles Jones, Ph.D., Dean, College of Engineering, Technology, and Management, 1997-2015


Cecil R. Lake, M.Ed., Professor, Director of Planning and Research, 1949-1986.


John W. Lund, Ph.D., Professor, Civil Engineering, and Director, Geo-Heat Center, 1967-1999.


Marla Miller, M.S., Management, 1998-2013


Richard M. Moore, Ph.D., Professor and Director, Wilsonville Operations, 1972-1997.


Julianne Murray, M.A., Associate Professor, Management, 1987-2011.

Gary J. Naseth, Ph.D., Professor, Humanities and Social Sciences, 1975-2009.

JoAnne M. Ogborn, M.S., Professor, Director, Extended Studies and Summer Session, 1968-1996.


Ralph L. Pettit, M.S., Professor, Humanities and Social Sciences, 1969-1986.


John R. Puckett, B.A. Associate Professor, Communication 1986-2012.

Winston D. Purvine, L.L.D., President, Oregon Institute of Technology; M.S. (1998), Southern Oregon University; B.S.N. (1986), Oregon Institute of Technology; M.S.E. (1999), Portland State University.


Margaret E. Reid, M.S., Associate Professor, Nursing, 1981-1997.


Mata A. Rust, M.S., Professor, Communication Department, 1972-1999.

Kathleen Sale, Associate Professor, Natural Sciences. B.S.N. (1986), Oregon Institute of Technology; M.S. (1998), Southern Oregon University.

Joseph E. Sarsenski, Ph.D., Professor, Civil Engineering, 1998-2008.

Andrew J. Sedlock, M.S., Professor, Electrical Engineering and Renewable Energy, 1988-2008

Edward Silling, Ph.D., Professor, Communication Department, 1975-2003.


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