

Section 1 – Program Mission and Educational Objectives

Oregon Tech Mission:

Oregon Institute of Technology, an Oregon public university, 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 Oregonians and provides information and technical expertise to state, national and international constituents.

Core Theme 1: Applied Degree Programs

Oregon Tech offers innovative and rigorous applied degree programs. The teaching and learning model at Oregon Tech prepares students to apply the knowledge gained in the classroom to the workplace.

Core Theme 2: Student and Graduate Success

Oregon Tech fosters student and graduate success by providing an intimate, hands-on learning environment, which focuses on application of theory to practice. The teaching and support services facilitate students' personal and academic development.

Core Theme 3: Statewide Educational Opportunities

Oregon Tech offers statewide educational opportunities for the emerging needs of Oregon's citizens. To accomplish this, Oregon Tech provides innovative and rigorous applied degree programs to students across the state of Oregon, including high-school programs, online degree programs, and partnership agreements with community colleges and universities.

Core Theme 4: Public Service

Oregon Tech will share information and technical expertise to state, national, and international constituents.

Program Mission: The mission of the Computer Engineering Technology (CET) bachelor's 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 for our students. The program is to serve a constituency consisting of its students, alumni, and employers in industry and government. 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 our students to create, develop, and disseminate knowledge for the applied engineering environment,
- expose our students to cross-disciplinary educational programs, and
- provide high tech industry employers with graduates in the computer engineering technology profession

Mission Alignment:

Our program is very hands-on and thus aligns with Core Theme 1. Our graduates are in high demand by the industries we support. This is evidence that we are aligned with Core Theme 2. The program features two years of project-based learning environment with junior project and senior project.

Section 2 – Program Description and History

Program History

In 1965, OIT was invited to join a Technical Education consortium sponsored by a number of major computer manufacturers. In response, OIT developed an Electro-Mechanical Engineering Technology program. This program was based on a mix of existing EET, MET, Math and other support courses. The name of the program was changed to Computer Systems Engineering Technology in 1973 in order to better represent the course material and capabilities of graduates. Course offerings were expanded, refined and renumbered using CST prefixes to reflect their computer systems content. Since that time, the program has continued to evolve in order to track new developments in the field and keep graduates current. As of this time, the program is only offered on the Klamath Falls campus. The program has continuously evolved as industrial changes have warranted.

Program Enrollment

As of Fall 2020, enrollment in the Computer Engineering Technology program has seen a decline. The program is on a decline of 38% when compared with Fall 2016. The program is only located on the Klamath Falls campus. The table below shows CET students in the Portland-Metro campus which indicates students are finishing the degree at that campus.

Faculty from Computer Engineering Technology, Embedded Systems Engineering Technology, Software Engineering Technology, and Electrical Engineering concur that correctly labeling this program to Computer Engineering would improve enrollment.

Oregon TECH

Computer Systems Eng Tech Headcount - Fall 4th Week
October 29, 2020

Student location is based on the primary campus assigned to each student; however students may enroll at other/multiple locations.
Majors with asterisk (*) have been phased out.
Dual Majors are reported under each separate major.

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
Computer Engineering Tech	63	62	61	56	39
Klamath Falls	57	60	57	52	39
Full-Time	51	50	48	48	36
Part-Time	6	10	9	4	3
Portland-Metro	6	2	4	4	
Full-Time	4			2	
Part-Time	2	2	4	2	
Embedded Systems Eng Tech	57	57	69	80	68
Klamath Falls	53	56	42	45	38
Full-Time	31	29	36	40	36
Part-Time	4	7	6	5	2
Portland-Metro	22	21	27	35	30
Full-Time	11	10	14	16	14
Part-Time	11	11	13	19	16
Software Engineering Tech	283	273	270	272	266
Klamath Falls	147	157	159	157	159
Full-Time	124	126	133	135	133
Part-Time	23	31	26	22	26
Portland-Metro	136	116	111	115	107
Full-Time	62	51	51	59	56
Part-Time	74	65	60	56	51
Grand Total	403	392	400	408	373

Figure 1 CSET Headcount

Program Graduates

Graduate numbers for Computer Engineering Technology have remained relatively flat. Note that there is no Computer Engineering Technology program on the Portland Metro campus, but students may be finishing their degree at that location.



Computer Systems Eng Tech Degrees by Academic Year
October 29, 2020

Degree location is based on the primary campus assigned to each student at the time of graduation

Majors with asterisk (*) have been phased out.

Dual Majors are reported under each separate major.

	2015-16	2016-17	2017-18	2018-19	2019-20
Computer Engineering Tech	9	9	4	9	8
Assoc of Engineering					
Klamath Falls	5	3	1	1	2
Portland-Metro	1			1	
Bachelor of Science					
Klamath Falls	3	6	3	6	4
Portland-Metro				1	2
*Portland-Metro				1	1
Bachelor of Science					
Klamath Falls	3	5	2	6	4
Portland-Metro		1	2	4	6
Software Engineering Tech	49	44	44	51	41
Assoc of Engineering					
Klamath Falls	2	1	1	3	
Portland-Metro		1		1	2
Bachelor of Science					
Klamath Falls	24	15	16	22	17
Portland-Metro	23	27	27	25	22
Grand Total	61	59	52	70	59

Figure 2 CSET Degrees

Employment Rates and Salaries

Institutional data indicates that graduates of the Computer Engineering Technology program are successful in finding employment. Some recent employers include Intel, Ravensclaw, Mentor Graphics, Aristocrat Technologies, Garmin, McAfee, NCR, and IGT. Some graduates are also pursuing graduate degrees in a related field.

Oregon Tech Graduate Outcome Data												
a=2015 / 2016 / 2017 combined	% Employed		% Continuing Ed		% Seeking		% Not Seeking		Success Rate		Median Salary	
	a	b	a	b	a	b	a	b	a	b	a	b
b=2016 / 2017 / 2018 combined												
% among those reporting outcomes	90.0	89.9	6.7	7.0	2.8	2.5	0.5	0.5	97.2	97.5	\$ 58,000	\$ 60,000
Computer Engineering Technology	100	93	0	7	0	0	0	0	100		\$ 64,000	\$ 65,500
Embedded Systems Engineering Technology	88	75	13	13	0	13	0	0	100	87	\$ 60,000	\$ 60,000
Software Engineering Technology	93	89	0	1	5	8	2	2	95	92	\$ 65,000	\$ 67,000

Figure 3 Employment Data

Showcase Learning Experiences

- During the week of February 9th, 2020 Kevin Pintong took students to the Annual IPC Expo to participate in teaching a soldering workshop as well as explore the Expo.
- On October 7th, Larry Landis from Intel PSG gave a presentation on getting hired in Tech Talk, as well as ran a workshop on Intel FPGA High Speed I/O.
- On June 5th 2020, Junior project students participated in the campus wide virtual project symposium to showcase their projects. Industry Advisory Board members were also invited to attend.

Program Changes

Pramod Govindan left at the end of June 2020. A search for his replacement is ongoing.

Program Improvement Discussions

The mission statement for Computer Engineering Technology was reviewed. The following changes were made.

No changes were made.

The mission statement for Embedded Systems Engineering Technology was reviewed. The following changes were made.

No changes were made.

The Program Educational Objectives for Computer Engineering Technology were reviewed. The following changes were approved.

PSLO 1 indicated 'well-defined' instead of the correct 'broadly-defined'.

The Program Educational Objectives for Embedded Systems Engineering Technology were reviewed. The following changes were approved.

PSLO 1 indicated 'well-defined' instead of the correct 'broadly-defined'.

Faculty discussed implementation of staggered courses for freshman year for CST 162, CST 130, CST 131. Frequently student would fail or come in Winter or Spring term. We discussed offering trailers for each class, but also discussed purposefully holding back part of the class to make sure we had sufficient number of students in each trailer. Typically, trailer classes have difficulty with enrollment numbers and may not run. Faculty were ok with this idea since it meant students would get the course earlier if needed.

Industry Advisory Board Meeting

In the January 1, 2020 Industry Advisory Board meeting, we discussed the following questions. Meeting minutes are available as well.

1. Engineering Technology to Engineering changes
2. Changing from A-K to 1-5 for ABET assessment
 - a. Members commented that some removed outcomes were necessary in the workplace such as professional development, ethics, and professional development.
3. How do members feel about changing the junior project from 3 terms to two terms.

Todd stated this was done in the past and did not result in adequate training.

- One member stated that going to 2 terms might just make projects less in-depth. Another stated that there would not be averse affect if hardware, software or embedded had different junior project lengths.
- Todd stated that currently, junior project consists of:
 - 1st & 2nd term- development, testing
 - 3rd term- polish and preparing for Symposium
- Consensus was that reducing to two terms may not have a severe negative impact.

Phil asked if members thought it was important that we can currently state “two year-long projects.

- Members did not think this would have much impact in the marketplace.
- It was commented that by the 3rd term, interpersonal relations often start to fail and this can be a good teamwork learning situation.

4. In freshman year, sometimes the students may fail or come in out of sequence. Right now we only offer CST 162 Fall, CST 130 Winter, CST 131 Spring. Should we start offering these classes every term? This would mean we would have to stagger students, and the ‘common first year’ is somewhat broken up.
 - Member input was that if a student gets out of sequence, they need to take other classes and take the class next time it is offered. Part of this is based on the lack of faculty time to continually offer every class and minimal class size.
 - Phong stated they always have about 10 students for trailers. Portland Metro offer trailers in the summer so that students do not lose a year. Several members stressed that if the class is offered, it cannot be cut by the department.
 - Todd stated the number of winter starts has steadily decreased, thus the offering(s) have been hard to offer.
 - CST162 also is required for EE, so students can be picked up from that department.
5. The focus on the program is heavy on architecture. From a qualitative data from engineers in the field Kevin has spoken to, all job postings, industry is looking for digital systems people with DSP experience, moving from architecture focus. What do members think of changing the focus to digital logic/DSP?
 - One member stated his company is not doing a lot of DSP. He thinks applied filter to a clock and used a spectrum analyzer. Also, architecture is important, understating the peripherals and how they are used.
 - Currently, there is no DSP. Would it be worth taking something out to add DSP? Or signals and systems. Basically, how to do the math. Again, understating the architecture is valuable.

The only change that was rolled into action was the addition of trailer classes. Due to COVID, everything else was placed on hold.

Core Program Faculty



Douglas Lynn, Professor (KF)



Michael Healy, Assistant Professor (KF)



Phong Nguyen, Assistant Professor (PM)



Kevin Pintong, Interim Program Director Computer Engineering Technology, Associate Professor (KF)



George Drouant, Instructor (KF)



Pramod Govindan, Instructor (PM)



Troy Scevers, Program Director Embedded Systems Engineering Technology, Associate Professor (KF)

Section 3 – Program Student Learning Outcomes

Graduates 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 where they will be involved in solving problems through the development of hardware, software and embedded applications. Graduates may be involved in product design, testing and qualification, application engineering, customer support, sales, or public relations.

Program Educational Objectives

The Program Educational Objectives reflect those attributes a student of the CET program will practice in professional endeavors.

- Demonstrate technical competency through success in computer engineering technology positions and/or pursuit of engineering or engineering technology graduate studies if desired.
- Demonstrate competencies in communication and teamwork skills by assuming increasing levels of responsibility and leadership or managerial roles.
- Develop professionally, pursue continued learning, and practice computer engineering technology in a responsible and ethical manner.

Program Student Learning Outcomes

(1)an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.

(2)an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.

(3)an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.

(4)an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.

(5)an ability to function effectively as a member as well as a leader on technical teams.

Program Student Learning Outcomes Update

On September 18, 2020, the ESET and CET faculty met to review the mission statement, and program student learning outcomes. Faculty also met to discuss PSLO responsibilities for the 2020-2021 cycle, as well as outcomes for 2019-2020 cycle.

External validation

External validation of PSLO are achieved through the following:

- 1) Industry Advisory Board discussions
- 2) Graduate job placement and continuing education rates
- 3) ABET ETAC accreditation process

Section 4 – Curriculum Map

Program Student Learning Outcomes

Course	Major	Title	PSLO				
			1	2	3	4	5
CST 162		Digital Logic I	X				
CST 130		Computer Organisation	X				
CST 120		Embedded C	X				
CST 131		Computer Architecture	X				
CST 133		Digital Logic II	X	x			
CST 134		Instrumentation	X			X	
CST 250		Computer Assembly Language	X	x			
CST 204		Introduction to Microcontrollers	X	x	x		
CST 231		Digital Systems Design I	X		X		
CST 337		Embedded System Architecture	X	X	x	X	
CST 315		Embedded Sensor Interfacing & I/O	X			X	
CST 374		Embedded Project Proposal	X		X		
CST 371		Embedded Systems Development 1 (Junior Project)	X		X	X	X
CST 372		Embedded Systems Development 2 (Junior Project)	X		X		X
CST 373		Embedded Systems Development 3 (Junior Project)	X		X		X
CST 471		Embedded Senior Project 1	X		X		
CST 472		Embedded Senior Project 2	X		X		
CST 473		Embedded Senior Project 3	X		X		
CST 331	CpE	Microprocessor Peripheral Interfacing	X	X	x	X	
CST 418	CpE	Data Comm & Networks	X				
CST 351	CpE	Digital System Design II	X		x		
CST 344	CpE	Intermediate Computer Architecture	X				
CST 442	CpE	Advanced Computer Architecture	X				
CST 455	ES	System on a Chip Design	X				
CST 456	ES	Embedded System Testing	X				
CST 466	ES	Embedded System Security	X		X	x	
CST 417	ES	Embedded Networking	X				
CST 347	ES	Real Time Embedded Operating Systems	X				

X = Major component, x = minor component

The curriculum map was updated and approved on October 4, 2019.

Essential Student Learning Outcomes

Essential student learning outcomes are given in the table below at the introduction, practice, and capstone levels.

ISLO/ESLO Three Year Academic Assessment Cycle (Student Success)		
<u>Year 1 ISLO/ESLO's 2020-2021</u>	<u>Year 2 ISLO/ESLO's 2021-2022</u>	<u>Year 3 ISLO/ESLO's 2022-2023</u>
<p style="text-align: center;">Plan</p> <p>Communication, Teamwork, Ethical Reasoning Upcoming assignments & assessments; Reflect and Evaluate</p>	<p style="text-align: center;">Plan</p> <p>Diverse Perspectives including Cultural Sensitivity & Global Awareness Upcoming assignments & assessments; Reflect and Evaluate</p>	<p style="text-align: center;">Plan</p> <p>Inquiry & Analysis includes problem solving & Info literacy, critical analysis & logical thinking Quantitative Literacy & Reasoning Upcoming assignments & assessments; Reflect and Evaluate</p>
<p>PLAN: Course Selections, Assignment Design, Rubric Design. (Program Planning report due start of winter quarter, feedback given by spring term).</p>		
<p style="text-align: center;">Assess</p> <p>Inquiry & Analysis includes problem solving & Info literacy, critical analysis & logical thinking Quantitative Literacy & Reasoning Collect Academic Assessment (FALL & WINTER) Analyze (SPRING)</p>	<p style="text-align: center;">Assess</p> <p>Communication, Teamwork, Ethical Reasoning Collect Academic Assessment (FALL & WINTER) Analyze (SPRING)</p>	<p style="text-align: center;">Assess</p> <p>Diverse Perspectives including Cultural Sensitivity & Global Awareness Collect Academic Assessment (FALL & WINTER) Analyze (SPRING)</p>
<p>ASSESS: Direct Measures- (circle) Faculty Grades (Rubric), Standardized Tests, Exams, Pre and Post Test Designs, Competency-Based Demonstrations, Portfolios Indirect Measures- (circle) Faculty Grades-DFW, Surveys & Reflections, Course Evaluations, Graduation Rates, Retention Rates. Program Collect and Analyze Report due at the end of spring term and feedback given by fall term.</p>		
<p style="text-align: center;">Act</p> <p>Diverse Perspectives including Cultural Sensitivity & Global Awareness Close loops, make improvements and remeasure Engage campus (professional development)</p>	<p style="text-align: center;">Act</p> <p>Inquiry & Analysis includes problem solving & Info literacy, critical analysis & logical thinking Quantitative Literacy & Reasoning Close loops, make improvements and remeasure Engage campus (professional development)</p>	<p style="text-align: center;">Act</p> <p>Communication, Teamwork, Ethical Reasoning Close loops, make improvements and remeasure Engage campus (professional development)</p>

Section 5 – Assessment Cycle

The table below is the updated assessment cycle for 2019-2023. The assessment cycle below reflects changes made as a result of the ABET ETAC a-k to 1-5 learning outcomes change. PSLO are assessed in a three year cycle and the ESLO are assessed in a six year cycle. Each PSLO will have two direct measurements (two classes) with one indirect measurement, and each ESLO will have one direct measurement.

PSLO	ESLO	2019-2020 (This report)	2020-2021	2021-2022	2022-2023
(1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly engineering problems appropriate to the discipline; (ESLO Inquiry and Analysis)	Inquiry and Analysis		CET/ESET: CST 133 (Kevin) CET: CST 334, 442, 418 (Doug) ESET: CST 456 (Stephen)		
(2) an ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;		CST 315 (Pramod, George) CST 473 (Kevin, Phong)			CST 315 (George and Unknown) CST 473 (Unknown Phong)
(3) an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature; (ESLO Communication)	Communication	CST 371 (Mike, Phong) CST 473 (Kevin, Phong)		CST 472 (Phong and Unknown) CST 372 (Phong and Mike)	
(4) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results; (ESLO Quantitative Literacy)	Quantitative Literacy		ESLO CST 337 (Doug) CST 134 (George,)		
(5) an ability to function effectively as a member of a technical team. (ESLO Teamwork)	Teamwork	ESLO CST 371 (Mike, Phong)		CST 371 (Mike, Phong)	

				CST 231 (Kevin, Unknown)	
N/A	Diverse Perspectives				CST 471 (Kevin, Phong) ESLO Only CST 371(Mike, Phong)
N/A	Ethical Reasoning	-	-	CST 472 (Phong and Unknown) CST 372 (Phong and Mike)	

Section 6 – Assessment Activity

This year's assessment focused on the learning outcomes below, noting that we are now on ABET ETAC 1-5 learning outcomes.

Reference the following table and page numbers. Indirect assessment is provided as Student Exit survey in appendix. The indirect assessment for 2,3,5 indicate that we are meeting the PSLO, although due to small sample size it is not statistically strong.

Assessment	Program Student Learning Outcomes 3-year cycle Computer/Embedded Systems Engineering Technology B.S.	2019-2020	Page	Status
A (2)	an ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;	CST 472 KF CST 472 WL CST 315 KF CST 315 WL	p.16 p.18 p.20 p.21	OK
B (3)	an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature; (ESLO Communication)	CST 371 KF CST 371 WL CST 472 KF CST 472 WL	p.32 p.29 p.23 p.27	OK
C (5)	an ability to function effectively as a member of a technical team. (ESLO Teamwork)	CST 371-373 KF CST 371-373 WL	p.40 p.37	OK

Assessment A – KF - 472

Learning Outcome (2): an ability to design solutions for broadly-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;

Course/Event: CST 472

Level: Capstone

Assessor & Campus: Kevin Pintong at Klamath Falls

Activity: Student wrote work agreement outlining list of engineering tasks to complete for term. At end of term, student progress reviewed using individual work agreement between student and instructor.

Rubric:

1. See rubric below

Sample and Reliability: Eleven student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 472.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Student achieves grade of > 70% according to rubrics for each item. Overall, > 75% of students achieve success.

Performance Level:

Item		ESET	CET
1	Was the student more than 70% complete at the end of term according to discussion between student and instructor?	6/7 (86%) Avg.84.07/100, 1 below 70.	4/4 (100%) Avg. 81.25/100, all above 75.
2	Was the student able to formulate a list of items to design for the term? (Student resubmitted until the list was sufficiently broken down and addressed original requirements (Specific, Measureable, Attainable, Realistic, Timebound)	7/7(100%)	4/4 (100%)
	Overall	Pass Target	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: No improvement needed.

Initial development of work agreement assignment (Item 2)

Itemize a minimum of 20 items to be graded using a minimum of three different main topics. List work in such a manner that each item is similar in weight. It is recommended that you itemize more than 20 items. Increasing the number of items to be graded can improve your final score by reducing the weight for each individual item, as the minimum of 20 items means that each item will be weighted at 5 points. No partial credit will be assigned- Each item will be graded as complete or incomplete.

Grading of final progress according to work agreement assignment (Item 1)

Formula for final percent assigned: $\text{Items Complete} / \text{Total Items} * 100$. The functionality and grading criteria described here will dictate 20 percent of student grade as referenced by the work agreement section of the syllabus. Due date for the functionality listed above is the final exam date for the course.

Design well-defined tech problems Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Understand tech problem (Come up with work agreement)				7/7 ESET 4/4 CET
Design solution to problem (% complete at end of term)				6/7 ESET 4/4 CET

Assessment A – WL - 472

Learning Outcome (2): an ability to design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;

Course/Event: CST 472

Level: Capstone

Assessor & Campus: Phong Ngyuen at Wilsonville

Activity: Student beta prototype was assessed using an instructor assigned grading rubric (0-100)

Rubric:

- 2. See rubric below

Sample and Reliability: Ten student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 472.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Student achieves grade of > 70% according to rubrics for each item. Overall, > 75% of students achieve success.

Performance Level:

Item		ESET
1	Understand technical problem	2/2 (100 %)
2	Design solution to problem	2/2 (100%)
3	Tools	2/2 (100%)
	Overall	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: No improvement needed.

Design well-defined tech problems Rubric

Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Understand tech problem			2	
Design solution to problem			1	1
Tools			2	

Assessment A – KF - 315

Learning Outcome (2): an ability to design solutions for broadly-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;

Course/Event: CST 315

Level: Practice

Assessor & Campus: George Drouant at Klamath Falls

Activity: A laboratory exercise requiring student to build a microcontroller based water level control system using the LM393 comparator.

Rubric:

1. See below, and see appendix E for actual assignment.

Sample and Reliability: Twenty four artifacts collected. Scoring performed by instructor of record.

Multiple Sites: Terminology used in assignments are different but same content was covered. In this case, different labs were used.

Performance Target: Student achieves grade of > 70% according to rubrics for each item. Overall, > 75% of students achieve success.

Performance Level:

Item		Embedded	Computer
1	Understand technical problem	10/11 (91%)	12/13 (92%)
2	Design solution to problem	10/11 (91%)	12/13 (92%)
3	Understand how to use tools	10/11 (91%)	12/13 (92%)
	Overall	Pass Target	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: No improvement needed.

Assessment A – WL - 315

Learning Outcome (2): an ability to design solutions for broadly-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline;

Course/Event: CST 315

Level: Practice

Assessor & Campus: Pramod Govindan at Wilsonville

Activity: A laboratory exercise requiring student to build simple Analog to Digital and Digital to Analog converters as shown below. See assignment in Appendix A. Student graded from scale of 0-100

Rubric:

2. See below, and see appendix for actual assignment.

Sample and Reliability: Eleven student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 315.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Student achieves grade of > 70% according to rubrics for each item. Overall, > 75% of students achieve success.

Performance Level:

Item		ESET
1	Understand technical problem	4/4 (100%)
2	Design solution to problem	3/4 (75%)
3	Understand how to use tools	4/4 (100%)
	Overall	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: No improvement needed.

Rubric:

Design well-defined tech problems Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Understand tech problem			4	
Design solution to problem		1	1	2
Tools			1	3
	High Proficiency	Proficiency	Some Proficiency	Limited or no Proficiency
Understanding of Technical Problem	Clearly defines the problem and outlines necessary objectives in an efficient manner.	Problem statement has some ambiguity or misses some important issues	Problem is defined incorrectly or too narrowly. Key information is missing or incorrect	Problem not defined at all
Design of system to solve problem	can describe planned experiments and how they relate to the problem; relate hypotheses to previous knowledge;	Description of planned experiments, relation of hypotheses, identification of steps and timeline, can be accomplished	Fails to formulate hypotheses to test. Does not express possible outcomes.	No clue on how to solve problem
Tools	Consistently uses new procedures and tools successfully, and can describe rationale for them. Runs appropriate control and replicate experiments	Uses new methods and tools, but may not always be successful. May not accurately explain rationale. Control and replicate experiments run	Errors made in analytical methods, but sources of error aren't found. Appropriate control or replicate experiments not run.	Unfamiliar with rudimentary electrical measurement tools

Assessment B – KF - 472

Learning Outcome (3): an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature; (ESLO Communication)

Course/Event: CST 472

Level: Capstone

Assessor & Campus: Kevin Pintong at Klamath Falls

Activity: Student gave presentation and submitted PowerPoint based on preliminary design review.

Rubric:

- 3. OIT presentation rubric
- 4. Scoring Rubric for CSE 472 presentation

Sample and Reliability: Ten student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 472.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Student achieves grade of > 75% according to rubrics for each item. Overall, > 75% of students achieve success.

Performance Level:

Item		ESET	CET
1	Public speaking rubric	6/7 (86%) 3.34/4 avg score	4/4 (100%) 3.6/4 avg score
2	Course assignment rubric (Achieve >75%)	6/7 (86%) 84.14/100 avg score	4/4 (100%) 83.4/100 avg score
	Overall	Pass Target	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: Data provided in this report indicates that the Program Student Learning Objectives are being met for Klamath Falls. Limited sample size. May need to work on student delivery and style in subsequent senior project.

OIT Public Speaking Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Content			3/7(ESET)	4/4 (CET) 4/7 (ESET)
Organization				4/4 (CET) 7/7 (ESET)
Style		1/4 (CET) 4/7 (ESET)		3/4 (CET) 3/7 (ESET)
Delivery		¼ (CET) 4/7 (ESET)	¼ (CET) 1/7 (ESET)	2/4 (CET) 2/7 (ESET)
Visuals		¼ (CET) 1/7 (ESET)	¼ (CET) 1/7 (ESET)	2/4 (CET) 5/7 (ESET)
Total Avg		0/4 (CET) 1/7 (ESET)	2/4 (CET) 4/7 (ESET)	2/4 (CET) 2/7 (ESET)

Course Presentation Rubric

Category	Scoring Criteria	Possible	Avg Grade
Content	Introduce and remind audience of proposed system purpose; update timeline and requirements, budget. Explain any updates and changes.	5	
	Detailed system description- Including system block diagram highlighting system architecture.	5	
	Detailed hardware description – describe hardware in sufficient detail.*	30	
	Detailed software description – describe software in sufficient detail code.*		
	Accurate information is presented and sufficient information for an engineering audience is provided.	5	
	Live demo of system working	30	

Presentation	Was the speaker appropriately animated and did they maintain good eye contact with the audience?	3	
	Did the presenter use a clear voice and provide smooth delivery?	3	
	Did you feel engaged during the presentation?	3	
	Were you able to read the slides, and were they proofread?	3	
	Did you feel that the presenter communicated their project to you in a clear and concise manner?	3	
Cust. Interaction	Did the presenter correctly answer questions in a professional manner?	4	
Organization	Was information presented in a logical sequence?	3	
	Were sources (figures, tables, etc.) appropriately cited?	3	
	Total Points	100	83.4 (CET) 84.14 (ESET)

Assessment B– WL - 472

Learning Outcome (3): an ability to apply written, oral, and graphical communication in well-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature; (ESLO Communication)

Course/Event: CST 472

Level: Capstone

Assessor & Campus: Phong Ngyuen at Wilsonville

Activity: Student gave presentation and submitted PowerPoint based on preliminary design review.

Rubric:

1. OIT presentation rubric
2. Scoring Rubric for CSE 472 presentation

Sample and Reliability: Ten student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 472.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Achieve an average of 3/4 according to OIT oral presentation rubric grading. Achieve an average of 80/100 according to Embedded Program Rubric grading

Performance Level:

Item		ESET
1	Public speaking rubric	5/5 (100%) Avg 3.64/4
2	Course assignment rubric (Achieve >75%)	5/5 (100%) Avg 87.5/100
	Overall	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: Data provided in this report indicates that the Program Student Learning Objectives are being met for Klamath Falls. Limited sample size. May need to work on student delivery and style in subsequent senior project.

OIT-BEMB PSLO 3 an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

Criterion	Met.
Summary	All projects from 472 fulfilled requirements of rubrics
Improvement Narrative	Both project Preliminary Design Review were well conducted
Attachments	Appendix A

RESULTS:

OIT Public Speaking Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Content			2	3
Organization			1	4
Style			3	2
Delivery			1	4
Visuals			2	3

Assessment B– WL - 371 – Direct

Learning Outcome: an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

Course/Event: CST 371

Level: Capstone

Assessor & Campus: Phong Ngyuen at Wilsonville

Activity: Evaluation of presentation and powerpoint based on simulation of a Preliminary Design Review. Evaluation is based on a rubric

Rubric: See Appendix D- OIT Public speaking rubric

Sample and Reliability: Five student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 371.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Achieve an average of 3/4 according to OIT oral presentation rubric grading. Achieve an average of 80/100 according to Embedded Program Rubric grading

Performance Level:

CST 371

Item		ESET
1	Instructor evaluation > 80/100 with Embedded Program Rubric	100% students met Avg. 94.5/100
2	OIT Presentation rubric average $\frac{3}{4}$ or more	100% students met Avg. 3.5/ 4
		Pass metric

Successful performance criteria: 85% of teams were able to achieve >80/100 in documents

Students were rated on a point scale on rubric for each document

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: Both project Preliminary Design Review were well conducted

OIT Public Speaking Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Content			Team Bicycle	Team ASB
Organization				Team Asb Team Bicycle
Style			Team ASB Team Bicycle	
Delivery			Team Bicycle	Team ASB
Visuals			Team Bicycle	Team ASB

Embedded Program Rubric – CST 371

I. Presentation skills	Average Grade
A. Preparation (practiced prior to presenting, materials ready)	10
B. Eye contact/projection of voice/proper attire/no distraction	8.5
Improved on voice projection. Eye contact needs work for 2 of 3 members	
II. Document	
A. Problem identification	8.5
B. Plan/paper design (parts, costs, schematic, explanations of design details...)	9
C. Schedule (changes, problems, any deviations...)	9
D. Control	9
III. Hardware	
Initial parts testing	8.5
IV Software	
A. Overall software flow chart	10
B. Software tools required	10
III. Demonstration	10
TOTAL:	94.5

Assessment B– KF - 371 – Direct

Learning Outcome: an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

Course/Event: CST 371

Level: Capstone

Assessor & Campus: Michael Healy at Klamath Falls

Activity: Evaluation of presentation and powerpoint based on simulation of a Preliminary Design Review. Evaluation is based on a rubric

Rubric: See Appendix D- OIT Public speaking rubric

Sample and Reliability: Six student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 371.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Achieve an average of 3/4 according to OIT oral presentation rubric grading. Achieve an average of 80/100 according to CET & Embedded Program Rubric grading.

Performance Level:

CST 371

Item		ESET	CET
1	Instructor evaluation > 80/100 with Embedded Program Rubric	100% students met Avg. 99/100	100% students met Avg. 99/100
2	OIT Presentation rubric average $\frac{3}{4}$ or more	100% of mixed teams met Avg. 3.8/ 4	
		Pass	

Successful performance criteria: 100% of teams were able to achieve >80/100 in documents.

Students were graded based on a percentage for each category in the presentation document.

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: All Preliminary Design Reviews were fairly well conducted.

OIT Public Speaking Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Content				BluBlock RaspbRad Squeege Tempsur ElecDirBd ChromStr
Organization				BluBlock RaspbRad Squeege Tempsur ElecDirBd ChromStr
Style		ChromStr		BluBlock RaspbRad Squeege Tempsur ElecDirBd
Delivery		Tempsur		BluBlock RaspbRad Squeege ElecDirBd ChromStr
Visuals		Tempsur	ChromStr	BluBlock RaspbRad Squeege ElecDirBd

11.1.2019

Memo

To
JP Students

From
Prof. Healy

CC

Re
Rubric for Preliminary
Design Review –
**Tentatively scheduled
for weeks 7 and 8 of the
term (11/12 – 11/22)**

The Preliminary Design Review, or Baseline Design Review, serves as the initial technical review in which you attempt to present what you're working on to parties *outside of your team*. It's also an opportunity to solicit feedback regarding not only your project but also your process effectiveness. In other words, it allows to see your process from outside of your own team's frame of reference. It does this by forcing you to answer the following questions:

- How do I present to others what our team is doing in a concise manner, using language that makes sense? (effective communication)
- How do I describe the individual elements of my process and my project, and show how they link to the larger effort of what we are working towards, *and explain it all in under 35 minutes?* (comprehensive)
- Have I considered all the process elements that will result in our eventual success on this capstone? (inclusiveness / team self-evaluation)

Use powerpoint or equivalent, plus any props that you think you need in order to provide a complete presentation that doesn't exceed 35 minutes. Anticipate a Q & A session to follow immediately. Use the grading criteria below as a guide.

Presentation Document: Problem Identification

10% - A concise description of the problem as described in your project proposal. Probably one slide.

Presentation Document: Plan Preview

10% - This is a preview since you haven't submitted your Plan document yet. One or two slides showing subassembly breakdown, parts, costs, and a view of whatever schematics you have developed to date.

Presentation Document: Schedule

10% - One slide highlighting changes (anticipated changes), problems so far, and how you expect to handle deviations.

Presentation Document: Control

10% – One slide to discuss your thoughts on handling the contingencies for your Control document.

Hardware / Software / Demonstration

40% – I would expect *at least* three slides in order for you to show some depth of detail. You choose what you want to emphasize here. Some ideas:

- A discussion of hardware test plans
- What do you need to do as your parts begin rolling in?
- What is your team currently focused on?
- Share your ideas with respect to power calculations or package layout
- You could show a state machine diagram or other data flow / data management schemes that highlight your i/o
- You could software flowcharts. Do you have some pseudo code you can go through? Talk about some software tools you plan to use.

Get creative with your demonstrations. You may not have much in the way of output to demonstrate by week 7/8. Ideas:

- You could provide a conceptual demonstration similar to the way that architectural firms commission artists to render building plans. Automobile manufacturers build concept cars or publish 2-dimensional cels.

- You could find something on the internet that would serve as a demonstration. Embed it into your powerpoint.
- Physical props may be used.
- Use your camera to record a process that you're using or to film some early test you're working on.
- Use screen captures to demonstrate one of the software tools you plan to use.

Presentation Skills: Ample Preparation

10% – All team members **must be involved**. Divvy up the slides so each of you has something to present. Preparation includes preparation of materials. Run through your slides to be sure everything is ready. Look for typos and misprints. Practice your presentation a couple of times so you know you can keep it under 35 minutes.

Presentation Skills: Professionalism and Projection

10% – Proper attire. Business casual: no jeans, no tee shirts, and no sneakers.

Project your voice.

Speak in a tone and volume that can be heard by someone if they were standing at the very back of the room. Recognize the difference between practicing in an empty room as opposed to the real deal when the room is full. (I anticipate using PV107.) Bodies absorb sound, and people create a lot of ambient noise.

Make eye contact with your audience. Do this by visually engaging various audience members in a random fashion. This has a couple of positive effects. First of all it can automatically result in your not appearing distracted or fidgety. It also projects confidence – in other words, you won't appear nervous regardless of how you really feel psychologically.

Learning Outcome (3): an ability to function effectively as a member of a technical team

Course/Event: CST 371-373

Level: Capstone

Assessor & Campus: Phong Ngyuen at Wilsonville.

Activity: Student was evaluated using teamwork rubric and paper on teamwork.

Rubric:

1. OIT teamwork rubric in Appendix B

Sample and Reliability: Five student artifacts assessed. Limited sample size may skew results. Scoring was performed by faculty of record for CST 371-373.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Achieve 70% average or greater as cohort.

Performance Level:

Item		ESET
1	Instructor evaluation (Note, only two groups so sample size is very small)	79%
2	Team self evaluation	91%
	Overall	Pass Target

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: 4 of 5 students were satisfactory in teamwork. One in a team of two graded team at pre foundation and foundation level in three criteria. The reasons are legitimate. However, the team members were able to reconcile their differences and completed a good product.

4 of 5 students wrote good papers backing their decisions on the rubric. The unsatisfactory paper was simplistic and did not cover all points.

RESULTS:

INSTRUCTOR RUBRIC EVALUATION OF TEAMS – 2 teams total. Numbers in each box represent where teams were assessed to be

Performance Criteria	Capstone Level (4) The following are achieved <i>without prompting</i> from instructor:	Practice Level (3)	Foundation Level (2)	Pre-Foundation Level (1)	Pre-Foundation Level (0)
Identify and achieve goal/purpose	2				
Assume roles and responsibilities	1		1		
Communicate effectively		2			
Reconcile disagreement	1	1			
Share appropriately		1	1		
Develop strategies for effective action		1	1		
Cultural Adaptation	1	1			

11/14 = 79%

TEAM MEMBERS EVALUATION OF OWN TEAM – 5 students in 2 teams. Numbers in each box represent where teams were assessed to be

Performance Criteria	Capstone Level (4) The following are achieved <i>without prompting</i> from instructor:	Practice Level (3)	Foundation Level (2)	Pre-Foundation Level (1)	Pre-Foundation Level (0)
Identify and achieve goal/purpose	5				
Assume roles and responsibilities	4			1	
Communicate effectively	4		1		
Reconcile disagreement	5				
Share appropriately	4		1		
Develop strategies for effective action	4	1			
Cultural Adaptation	4	1			

31/35 = 91%

Learning Outcome (3): an ability to function effectively as a member of a technical team

Course/Event: CST 371-373

Level: Capstone

Assessor & Campus: Michael Healy at Klamath Falls

Activity: Students were evaluated using teamwork rubric.

Rubric:

1. OIT teamwork rubric in Appendix B

Sample and Reliability: Nine ESET and nine CET students were observed throughout the term. Scoring was performed by faculty of record for CST 371-373.

Multiple Sites: Terminology used in assignments are different but same content was covered.

Performance Target: Achieve 70% average or greater. Achieve up to 15% of term grade based on Professor Evaluation.

Performance Level:

Item		ESET	CET
1	Instructor evaluation	100%	93%
	Overall	Pass	Pass

History of Results: Not Available.

Faculty Discussion: Results are discussed in next cycle.

Interpretation: One of the nine CET students scored 6/15% on the Professor Evaluation. This student was at pre foundation level for two criteria and foundation level in one criteria. Reasons were primarily due to genuine scheduling issues, but professional behavior and tactfulness also needed to be addressed. Fortunately the student and the team were able to change and adapt, and found much more success during the subsequent terms.

These are my criteria for the ***Professor Evaluation*** item listed on your course syllabus. Each criterion is worth 3 percentage points for a cumulative total of 15% of your final term grade.

1. Putting forth a minimal effort toward completion of tasks.
2. Difficulty completing tasks. Repeatedly falling short of individual work deadlines.
3. Effortful involvement in all team meetings and class events.
4. Getting along well with other team members. Exhibiting tact and professional behavior.
5. Being supportive and helpful of your teammates in recognition of the common goals, tasks, and deadlines.

Prof. Mike Healy

RESULTS:

EVALUATION OF INDIVIDUAL STUDENTS – 9 ESET (E), 9 CET (C).

Performance Criteria	Capstone Level (4) The following are achieved <i>without prompting</i> from instructor:	Practice Level (3)	Foundation Level (2)	Pre-Foundation Level (1)	Pre-Foundation Level (0)
Identify and achieve goal/purpose	9 (E) 8 (C)			1 (C)	
Assume roles and responsibilities	9 (E) 8 (C)		1 (C)		
Communicate effectively	9 (E) 9 (C)				
Reconcile disagreement	9 (E) 9 (C)				
Share appropriately	9 (E) 8 (C)			1 (C)	
Develop strategies for effective action	9 (E) 9 (C)				
Cultural Adaptation	9 (E) 9 (C)				

ESET: 63/63 (100%) > Foundational Level

CET: 60/63 (95%) > Foundational Level

Objective:

1. To design and build a simple Analog-to-Digital (ADC) and Digital-to-Analog (DAC) converter using OpAmp circuits and resistors.
2. To apply Thévenin's theorem to analyze an R-2R ladder network.
3. To build DAC and connect ADC to DAC, and compare the input signal to the reconstructed output signal.

(This is a 2 week lab).

Pre-lab assignment:

DAC:

1. A practical circuit to implement a DAC converter is a **R-2R ladder** network, as shown in Figure 1a.

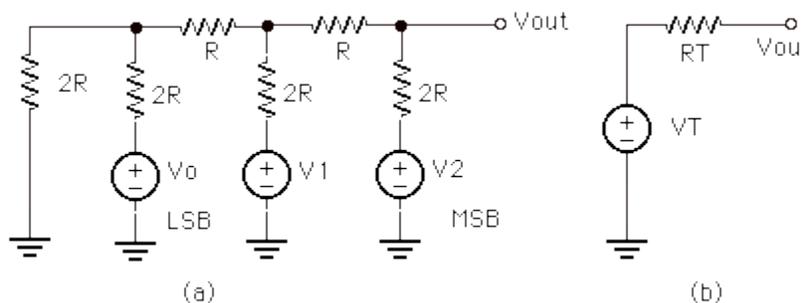


Figure 1: (a) R-2R ladder network; (b) Thévenin's equivalent network

Do a detailed circuit analysis in your notebook to show that the Thévenin's equivalent resistance and voltage, as shown in Figure 1b, is equal to:

$$R_T = R \text{ and}$$

$$V_T = (V_2/2 + V_1/4 + V_0/8)$$

You can use the superposition principle to find Thévenin's equivalent voltage.

2. Assume that the voltages in the circuit of Fig. 1 can be either 0 or 5V, what is the smallest increment of the output voltage V_{out} in the previous circuit of Fig. 1 (for one increment in binary number), i.e. the value of 1 LSB?
3. Design an OpAmp interface circuit whose input connects to the output of the R-2R ladder network so that each increment in the binary number produces 1V (or a -1V) increase (decrease) in output

voltage V_{DAC} (e.g. a $(001)_2$ gives a 1V output, a $(011)_2$ gives a 3V, while a $(111)_2$ gives a 7V output). Give the circuit and the calculations to find the resistor values.

4. In your lab report, calculate the expected analog output voltage (at the output of the OpAmp circuit) for each of the binary words of Table I

Table 1

b2	b1	b0	VDAC (calc.) (Volt)	Vout(meas.) (Volt)	% diff.
0	0	0	.	.	.
0	0	1	.	.	.
0	1	0	.	.	.
0	1	1	.	.	.
1	0	0	.	.	.
1	0	1	.	.	.
1	1	0	.	.	.
1	1	1	.	.	.

5. Draw a diagram similar to the one given below in Figure 2, using the calculated values for V_{DAC} .

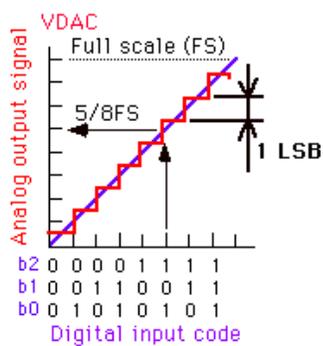


Figure 2

ADC:

6. Figure 3 shows a circuit that implements an *Analog-to-Digital Converter (ADC)*. This circuit takes an analog signal and gives a digital output.

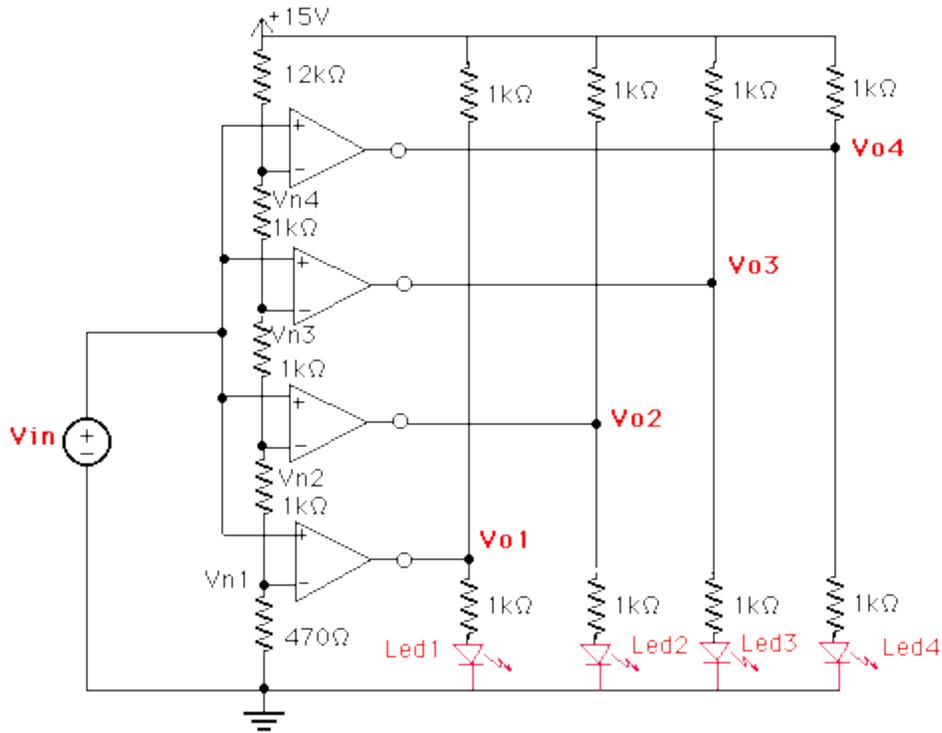


Figure 3: Flash Analog-to-Digital Converter

The circuit consists of 4 comparators whose inverting inputs are connected to a voltage divider. A comparator is basically an operational amplifier used without feedback. The outputs of the comparators in Figure 3 correspond to a digital word. When the input rises above V_{N1} , the first comparator will switch to a high output voltage causing the LED to light up, indicating a (0001). For larger input voltages the output of other comparators will switch high as well. For large input voltages (above V_{N3}) all comparators will be high corresponding to (1111) digital output. Thus the comparators encode the analog input as a digital word on a *thermometer scale*.

All comparators work in parallel which makes this ADC very fast. For that reason it is called a Flash Converter.

Calculate and record in your report, the values of V_{ni} when (for what value range of V_{in}) each comparator will switch.

In-lab assignment:

A. Equipment:

- 1. Digital multimeter
- 2. Programmable power supply: 5V, -5V
- 3. Protoboard
- 4. Cables and connectors
- 5. Resistors: 1kΩ, 12kΩ, 470Ω

- 6. Potentiometer
- 7. Four LEDs
- 8. Four Quad Comparator LM 339 (quad=four devices in one package)

B. Procedure

- Build the flash ADC as shown in Figure 3. Use one LM339 comparator for building the circuit. LM339 is a quad comparator that needs pull-up resistors to enable output voltages.

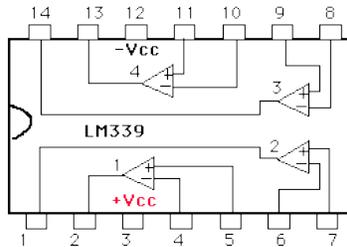


Figure 4: Pin-out of the LM339 Quad Comparator

- Vary the input voltage and record the values of the input voltage when each LED switches on. Note down the value of the input voltage when each of the LED lights up.

Table II

	Led1	Led2	Led3	Led4
Input voltage required for LEDs to turn ON				

- *Give a demo to the lab instructor.*

Appendix B:

ESLO 4 Teamwork:

Oregon Tech students will collaborate effectively in teams or groups.

Definition

Teamwork encompasses the ability to accomplish group tasks and resolve conflict within groups and teams while maintain and building positive relationships within these groups. Team members should participate in productive roles and provide leadership to enable an interdependent group to function effectively.

Performance Criteria	Capstone Level (4) The following are achieved <i>without prompting</i> from instructor:	Practice Level (3)	Foundation Level (2)	Pre-Foundation Level (1)	Pre-Foundation Level (0)
Identify and achieve goal/purpose	<ul style="list-style-type: none">When appropriate, realistic, prioritized and measurable goals are agreed upon and documented.All team members share the common objectives/purpose.Team achieves goal.	<ul style="list-style-type: none">When appropriate, realistic, prioritized and measurable goals are agreed upon and documented.All team members share the common objectives/purpose.Team achieves goal.	<ul style="list-style-type: none">Group shares common goals and purpose.Few priorities are unrealistic or undocumented.Group achieves goal.	<ul style="list-style-type: none">Individuals share some goals but a common purpose may be lacking.Priorities may be unrealistic and documentation may be incomplete.Group may not achieve goal.	<ul style="list-style-type: none">Clear goals are not formulated or documented; thus all members don't accept or understand the purpose/task of the group.Group does not achieve goal.

<p>Assume roles and responsibilities</p>	<ul style="list-style-type: none"> • Members consistently and effectively fulfill roles and responsibilities. • Leadership roles are clearly defined and/or shared. • Members move team toward the goal by giving and seeking information or opinions, and assessing ideas and arguments critically. • Members are all self-motivated and complete assignments on time. • Most members attend all meetings. • Members reflect on group processes, provide feedback to other group members and make changes as necessary. 	<ul style="list-style-type: none"> • Members consistently and effectively fulfill roles and responsibilities. • Leadership roles are clearly defined and/or shared. • Members move team toward the goal by giving and seeking information or opinions, and assessing ideas and arguments critically. • Members are all self-motivated and complete assignments on time. • Most members attend all meetings. • Members reflect on group processes, provide feedback to other group members and make changes as necessary. 	<ul style="list-style-type: none"> • Members often fulfill roles and responsibilities. Leadership roles are generally defined and/or shared. • Generally, members are motivated and complete assignments in a timely manner. • Many members attend most meetings. 	<ul style="list-style-type: none"> • Some members may not fulfill roles and responsibilities. • Leadership roles are not clearly defined and/or effectively shared. • Some members are not motivated and some assignments are not completed in a timely manner. • Meetings rarely include most members. 	<ul style="list-style-type: none"> • Members do not fulfill roles and responsibilities. • Leadership roles are not defined and/or shared. • Members are not self-motivated and assignments are not completed on time. • Many members miss meetings. • Members continue processes that prove nonfunctional.
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Performance Criteria	Capstone Level (4) The following are achieved <i>without prompting</i> from instructor:	Practice Level (3)	Foundation Level (2)	Pre-Foundation Level (1)	Pre-Foundation Level (0)
Communicate effectively	<ul style="list-style-type: none"> Members always communicate openly and respectfully. Members listen to each other's ideas. Members support and encourage each other. Communication patterns foster a positive climate that motivates the team and builds cohesion and trust. 	<ul style="list-style-type: none"> Members always communicate openly and respectfully. Members listen to each other's ideas. Members support and encourage each other. Communication patterns foster a positive climate that motivates the team and builds cohesion and trust. 	<ul style="list-style-type: none"> Members usually communicate openly and respectfully. Members often listen to most ideas. Members usually support and encourage each other. 	<ul style="list-style-type: none"> Members may not consistently communicate openly and respectfully. Members may not listen to each other. 	<ul style="list-style-type: none"> Members do not communicate openly and respectfully. Members do not listen to each other. Communication patterns undermine teamwork
Reconcile disagreement	<ul style="list-style-type: none"> All members welcome disagreement and use difference to improve decisions. All members respect and accept disagreement and employ effective conflict resolution skills. Subgroups absent. 	<ul style="list-style-type: none"> All members welcome disagreement and use difference to improve decisions. All members respect and accept disagreement and employ effective conflict resolution skills. Subgroups absent. 	<ul style="list-style-type: none"> Many members welcome disagreement and use difference to improve decisions. Most members respect and accept disagreement and work to account for differences. Subgroups rarely present. 	<ul style="list-style-type: none"> Few members welcome disagreement. Difference often results in voting. Some members respect and accept disagreement and work to account for differences. Subgroups may be present. 	<ul style="list-style-type: none"> Members do not welcome disagreement. Difference often results in voting. Subgroups are present.

<p>Share appropriately</p>	<ul style="list-style-type: none"> • All members contribute significantly to discussions, decision making and work. • The work product is a collective effort; team members have both individual and mutual accountability for the successful completion of the work product. 	<ul style="list-style-type: none"> • All members contribute significantly to discussions, decision making and work. • The work product is a collective effort; team members have both individual and mutual accountability for the successful completion of the work product. 	<ul style="list-style-type: none"> • Many members contribute to discussions, decision-making and work. • Individuals focus on separate sections of the work product, but have a coordinator who ties the disparate parts together (they rely on the sum of each individual's work). 	<ul style="list-style-type: none"> • Contributions are unequal although all members contribute something to discussions, decision making and work. • Coordination is sporadic so that the final work product is of uneven quality. 	<ul style="list-style-type: none"> • Contributions are unequal. • Certain members dominate discussions, decision making, and work. • Some members may not contribute at all. • Individuals work on separate sections of the work product, but have no coordinating effort to tie parts together.
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Performance Criteria	Capstone Level (4) The following are achieved <i>without prompting</i> from instructor:	Practice Level (3)	Foundation Level (2)	Pre-Foundation Level (1)	Pre-Foundation Level (0)
Develop strategies for effective action	<ul style="list-style-type: none"> Members use effective decision making processes to decide on action. Group shares a clear set of norms and expectations for outcomes. Group reaches consensus on decisions and produces detailed plans for action. 	<ul style="list-style-type: none"> Members use effective decision making processes to decide on action. Group shares a clear set of norms and expectations for outcomes. Group reaches consensus on decisions and produces detailed plans for action. 	<ul style="list-style-type: none"> Members usually use effective decision making processes to decide on action. Most of the group shares norms and expectations for outcomes. Group reaches consensus on most decisions and produces plans for action. 	<ul style="list-style-type: none"> Members sometimes use decision making processes to decide on action. Some of the members of the group do not share norms and expectations for outcomes. Group sometimes fails to reach consensus. Plans for action are informal and often arbitrarily assigned. 	<ul style="list-style-type: none"> Members seldom use decision making processes to decide on action. Individuals often make decisions for the group. The group does not share common norms and expectations for outcomes. Group fails to reach consensus on most decisions. Group does not produce plans for action.
Cultural Adaptation	<ul style="list-style-type: none"> Members always recognize and adapt to differences in background and communication style. 	<ul style="list-style-type: none"> Members always recognize and adapt to differences in background and communication style. 	<ul style="list-style-type: none"> Members usually recognize and adapt to differences in background and communication style. 	<ul style="list-style-type: none"> Members may recognize, but do not adapt to differences in background and communication style 	<ul style="list-style-type: none"> Members do not recognize differences in background or communication style.

Appendix D

OIT Public Speaking rubric

OIT Public Speaking Rubric				
Performance Criteria	No/Limited Proficiency (1)	Some Proficiency (2)	Proficiency (3)	High Proficiency (4)
Content	Few or no attributed sources. Supporting materials lack credibility and/or don't relate to thesis. Limited or no attempt to inform or persuade.	Some attributed sources used. Supporting materials are somewhat credible and/or don't clearly relate to thesis. Attempt to inform or persuade.	Adequate number of credible and appropriately attributed sources used. Supporting materials relate to thesis. Informs or persuades.	A variety of credible and appropriate sources used. Supporting materials relate in an exceptional way to a focused thesis. Informs or persuades.
Organization	Lacks organizational structure. Introduction and/or conclusion missing. No transitions used.	Organizational structure present but unclear with underdeveloped introduction and conclusion. Transitions are awkward.	Appropriate organizational pattern used and easy to follow with developed introduction and satisfying conclusion. Main points are smoothly connected with transitions.	Organizational pattern is compelling and moves audience through speech with ease. Introduction draws in the audience and conclusion is satisfying. Main points are smoothly connected with transitions.
Style	No understanding of audience regarding topic or purpose of speech. Little enthusiasm and passion for topic. No regard for time constraints.	Some understanding of audience regarding topic or purpose of speech. Some enthusiasm and passion for topic. Some regard for time constraints.	Competent understanding of audience regarding topic and purpose. Enthusiasm and passion for topic. Speech given within time constraints.	Thorough understanding of audience regarding topic and purpose. Clear enthusiasm and passion for topic. Speech given within time constraints.
Delivery	No gestures or eye contact. Monotone voice or insufficient volume. Little poise. Reading of notes only. Abundant oral	Some gestures and eye contact. Ineffective use of language and voice. Little poise. Heavy reliance on notes. Multiple oral fillers and nonverbal distractions.	Adequate use of gestures, eye contact, language, and voice. Poised with minor reliance on notes. Limited oral fillers and nonverbal distractions.	Effective use of gestures, eye contact, vivid language, and voice to add interest to speech. Poised with use of notes for reference only. No

	fillers and nonverbal distractions.			oral fillers and nonverbal distractions.
Visuals	No visuals or poorly-designed and documented visuals that distract from speech or do not create interest. Limited reference to visuals or so much reference delivery is hindered.	Visuals present, but simply designed with limited use of documentation. Visuals are referred to but do not create interest. Visuals may interfere with delivery.	Well-designed and documented visuals that clarify speech and create interest. Visuals are referred to and sufficiently discussed, while not interfering with delivery.	Well-designed and documented visuals that clarify speech, create interest, and hold attention of the audience. Visuals are sufficiently discussed and effectively integrated into speech.

OREGON INSTITUTE OF TECHNOLOGY
Computer Systems Engineering Technology Department
CST 315 – Embedded Sensor Interfacing I/O
Lab 8 – Water Level Control System

EQUIPMENT AND SUPPLIES:

- Oscilloscope with probes
- Set of probes for DMM
- Alligator clip cables to connect to the bench power supply
- 330 Ohm resistor
- 220 Ohm resistor
- 1 Meg resistor
- 3 – 100K resistors
- 2 – 3.3K resistors
- 2 – 10K resistors
- Water level sensor
- LM393 Comparator
- 4N33 Optoisolator
- TN0610N3-G N-Channel MOSFET
- Arduino microcontroller
- Pump motor with tubing
- Diode (1N4004)
- 2 – plastic buckets

In today's lab you will construct a microcontroller based water level control system – see diagrams below. You will use the water level sensor you built and tested, along with the relaxation oscillator you constructed from the LM393 comparator. The second half of the LM393 will be used as a buffer between the water level sensor and the input of the Arduino microcontroller (Arduino pin 8 is suggested as the input pin). The Arduino will control the operation of a pump motor – you may use a simple on/off control scheme or one based on pulse width modulation to control the pump. The pump motor control circuit is the same circuit you constructed to operate a relay in the last lab with the exceptions that the relay is replaced by the pump, and the voltage is reduced from 12V to 5V.

Your system will pump water from Bucket A (initially filled with water) to Bucket B (initially empty). The control system will fill Bucket B to a depth of three inches. When a depth of three inches is reached the system will stop filling Bucket B. The pump must not turn on again unless water is removed from Bucket B. The instructor will use a cup to transfer water from Bucket B to Bucket A. The control system will detect the drop in water level and again fill Bucket B to three inches of water.

Figure 1

Figure 2

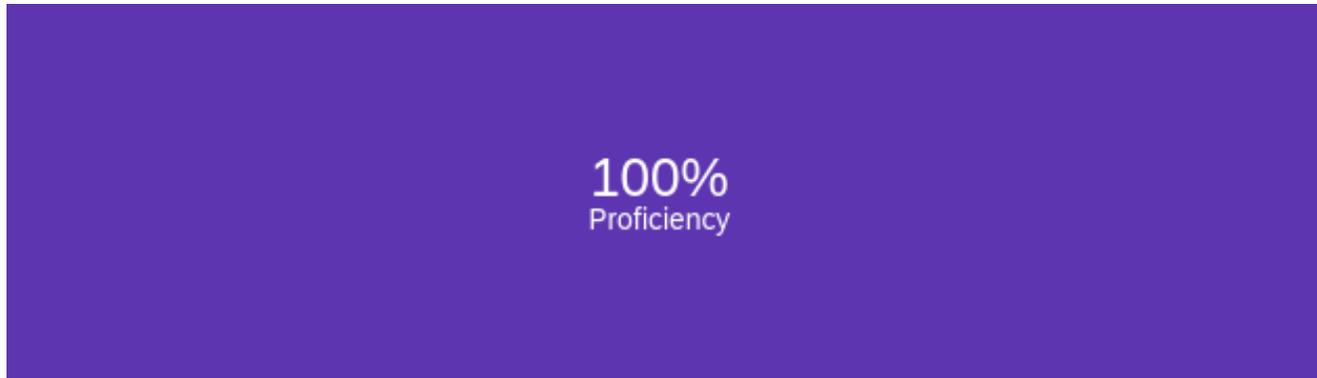
Figure 3

BCMP – Computer Engineering Technology BS

(2019-20) Student Exit Survey

February 1st 2021, 4:48 pm PST

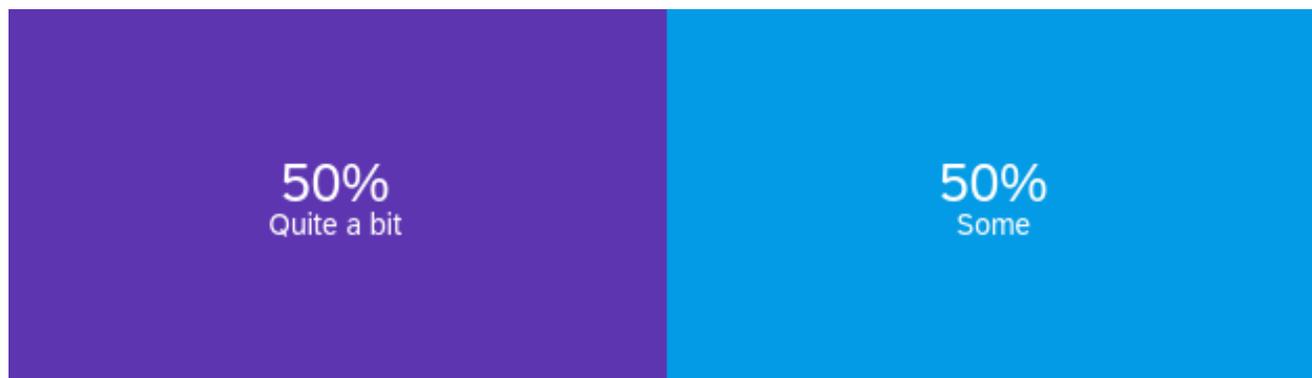
Q ESLO 1 - Oregon Tech Essential Student Learning Outcomes Please rate your proficiency in the following areas.



■ High proficiency
 ■ Proficiency
 ■ Some proficiency
 ■ Limited proficiency

#	Question	High proficiency		Proficiency		Some proficiency		Limited proficiency		Total
1	ESLO 1a. Communication: Writing effectively	0.00%	0	100.00%	2	0.00%	0	0.00%	0	2
2	ESLO 1b. Communication: Speaking effectively	0.00%	0	50.00%	1	50.00%	1	0.00%	0	2
3	ESLO 2. Inquiry & Analysis: Thinking critically and analytically	0.00%	0	50.00%	1	50.00%	1	0.00%	0	2
4	ESLO 3. Ethical Reasoning: Making ethical judgements	0.00%	0	100.00%	2	0.00%	0	0.00%	0	2
5	ESLO 4. Teamwork: Work effectively with groups and teams	50.00%	1	50.00%	1	0.00%	0	0.00%	0	2
6	ESLO 5. Quantitative Literacy: Using quantitative/numerical information to solve problems, evaluate claims, and support decisions	50.00%	1	50.00%	1	0.00%	0	0.00%	0	2
7	ESLO 6. Diverse Perspectives: Understanding of diverse perspectives to improve interactions with others	0.00%	0	100.00%	2	0.00%	0	0.00%	0	2

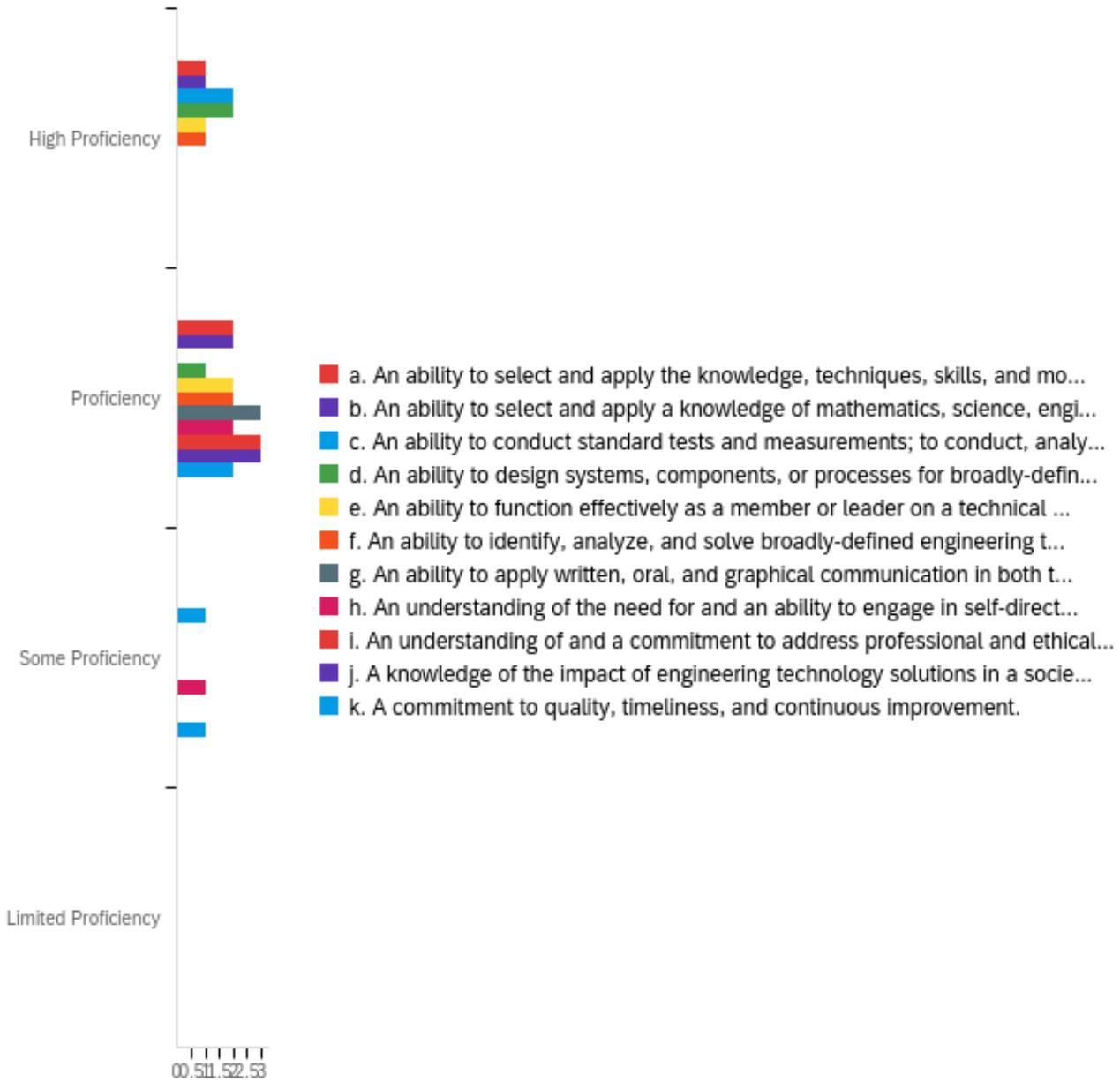
Q ESLO 2 - Oregon Tech Essential Student Learning Outcomes How much has your experience at Oregon Tech contributed to your knowledge, skills, and personal development in these areas?



Very much Quite a bit Some Very little

#	Question	Very much	Quite a bit	Some	Very little	Total
1	ESLO 1a. Communication: Writing effectively	0.00%	0	50.00%	1	2
2	ESLO 1b. Communication: Speaking effectively	0.00%	0	50.00%	1	2
3	ESLO 2. Inquiry & Analysis: Thinking critically and analytically	0.00%	0	50.00%	1	2
4	ESLO 3. Ethical Reasoning: Making ethical judgements	0.00%	0	100.00%	2	2
5	ESLO 4. Teamwork: Work effectively with groups and teams	0.00%	0	100.00%	2	2
6	ESLO 5. Quantitative Literacy: Using quantitative/numerical information to solve problems, evaluate claims, and support decisions	0.00%	0	100.00%	2	2
7	ESLO 6. Diverse Perspectives: Understanding of diverse perspectives to improve interactions with others	0.00%	0	50.00%	1	2

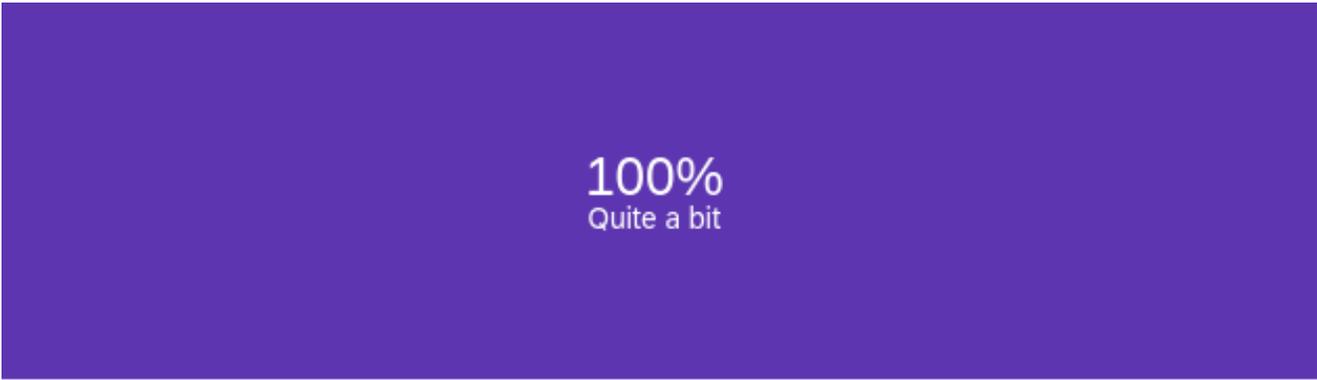
Q BCMP 1 - Program Student Learning Outcomes for Computer Engineering Technology B.S.
Please rate your proficiency in the following areas.



#	Question	High Proficiency	Proficiency	Some Proficiency	Limited Proficiency	Total
1	a. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.	33.33%	66.67%	0.00%	0.00%	3
2	b. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the	33.33%	66.67%	0.00%	0.00%	3

	application of principles and applied procedures or methodologies.									
3	c. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.	66.67%	2	0.00%	0	33.33%	1	0.00%	0	3
4	d. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.	66.67%	2	33.33%	1	0.00%	0	0.00%	0	3
5	e. An ability to function effectively as a member or leader on a technical team.	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
6	f. An ability to identify, analyze, and solve broadly-defined engineering technology problems.	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
7	g. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.	0.00%	0	100.00%	3	0.00%	0	0.00%	0	3
8	h. An understanding of the need for and an ability to engage in self-directed continuing professional development.	0.00%	0	66.67%	2	33.33%	1	0.00%	0	3
9	i. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.	0.00%	0	100.00%	3	0.00%	0	0.00%	0	3
10	j. A knowledge of the impact of engineering technology solutions in a societal and global context.	0.00%	0	100.00%	3	0.00%	0	0.00%	0	3
11	k. A commitment to quality, timeliness, and continuous improvement.	0.00%	0	66.67%	2	33.33%	1	0.00%	0	3

Q BCMP 2 - Program Student Learning Outcomes for Computer Engineering Technology B.S.
How much has your experience at Oregon Tech contributed to your knowledge, skills, and personal development in these areas?

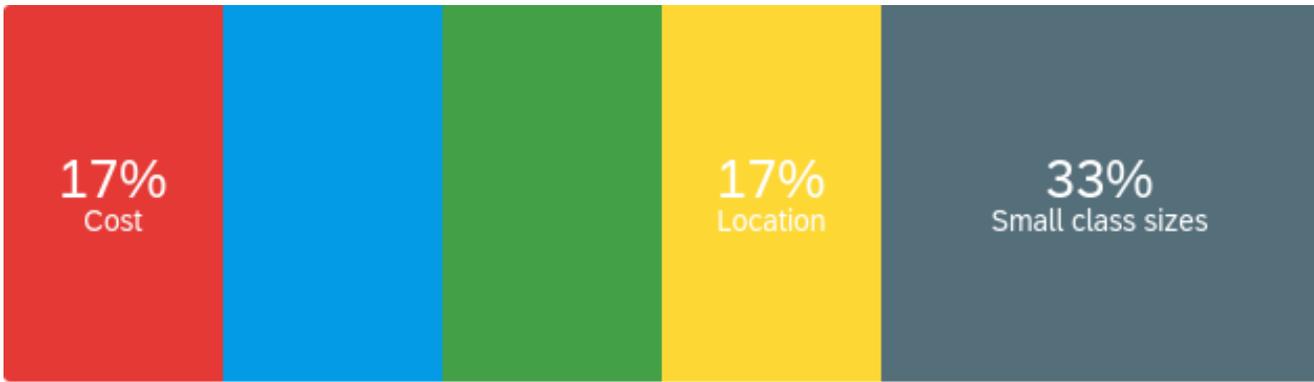


■ Very much
 ■ Quite a bit
 ■ Some
 ■ Very little

#	Question	Very much	Quite a bit	Some	Very little	Total
1	a. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.	0.00%	100.00%	0	3	3
2	b. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.	0.00%	100.00%	0	3	3
3	c. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.	0.00%	33.33%	66.67%	0	3
4	d. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives.	0.00%	100.00%	0	3	3
5	e. An ability to function effectively as a member or leader on a technical team.	33.33%	33.33%	33.33%	0	3
6	f. An ability to identify, analyze, and solve broadly-defined engineering technology problems.	0.00%	100.00%	0	3	3
7	g. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.	0.00%	66.67%	33.33%	0	3
8	h. An understanding of the need for and an ability to engage in self-directed continuing professional development.	0.00%	66.67%	33.33%	0	3

9	i. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.	0.00%	0	100.00%	3	0.00%	0	0.00%	0	3
10	j. A knowledge of the impact of engineering technology solutions in a societal and global context.	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
11	k. A commitment to quality, timeliness, and continuous improvement.	0.00%	0	33.33%	1	66.67%	2	0.00%	0	3

Q BCMP 3 - What attracted you to Oregon Tech? Please check all that apply.



■ Cost
 ■ Financial aid package
 ■ High employment rates upon graduation

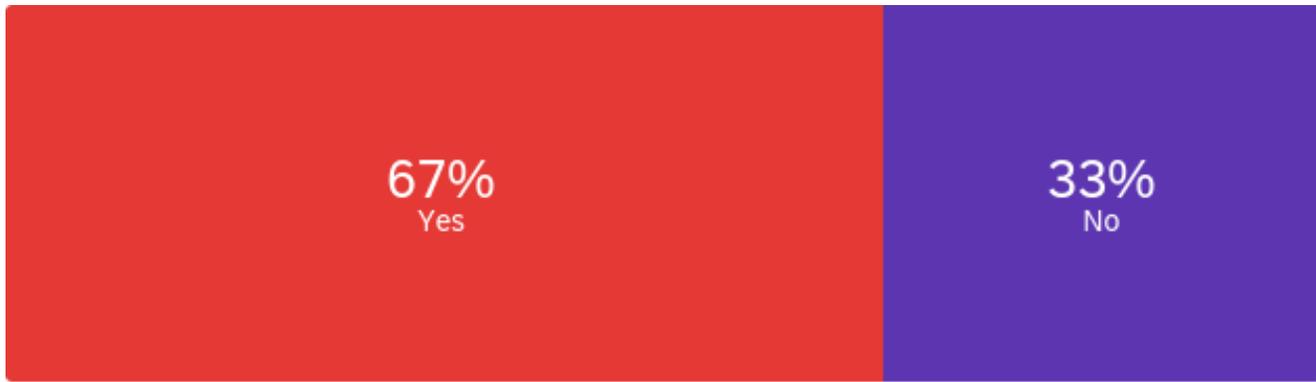
■ Reputation of major
 ■ Location
 ■ If other, please specify:
 ■ Small class sizes

#	Answer	%	Count
1	Cost	16.67%	1
2	Financial aid package	0.00%	0
3	High employment rates upon graduation	16.67%	1
4	Reputation of major	16.67%	1
5	Location	16.67%	1
6	If other, please specify:	0.00%	0
7	Small class sizes	33.33%	2
	Total	100%	6

If other, please specify:

If other, please specify: - Text

Q BCMP 4 - Was Oregon Tech your first choice?



■ Yes ■ No

#	Answer	%	Count
1	Yes	66.67%	2
2	No	33.33%	1
	Total	100%	3

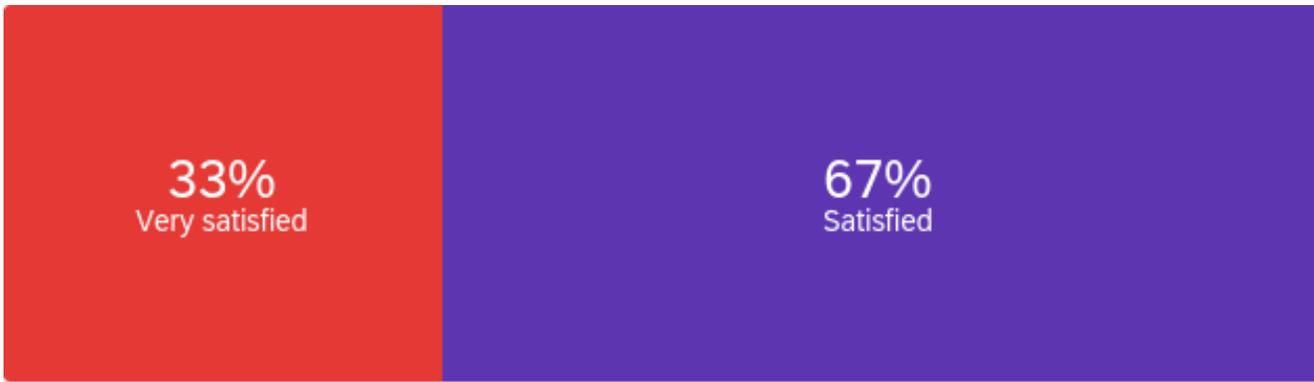
Q BCMP 5 - At what stage in your studies did you choose your major?



■ High School
 ■ Freshman year in college
 ■ Sophomore year in college
■ Junior year in college or later

#	Answer	%	Count
1	High School	66.67%	2
2	Freshman year in college	33.33%	1
3	Sophomore year in college	0.00%	0
4	Junior year in college or later	0.00%	0
	Total	100%	3

Q BCMP 6 - Please indicate your level of satisfaction with the program in the following areas.



■ Very satisfied
 ■ Satisfied
 ■ Dissatisfied
 ■ Very dissatisfied

#	Question	Very satisfied		Satisfied		Dissatisfied		Very dissatisfied		Total
1	Advising	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
2	Class schedule	0.00%	0	100.00%	3	0.00%	0	0.00%	0	3
3	Curriculum	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
4	Facilities	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
5	Quality of Instruction	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3

Q BCMP 7 - What are one or two specific things we could do to improve the program?

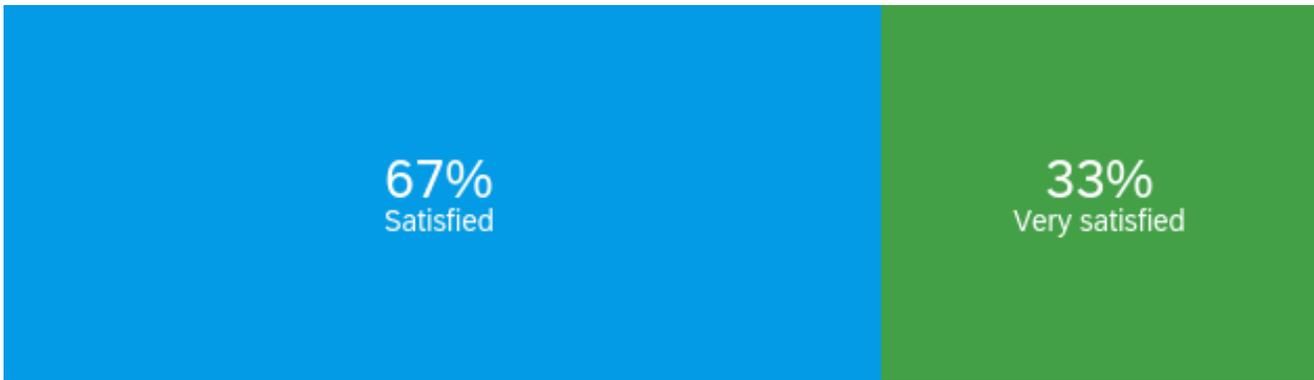
What are one or two specific things we could do to improve the program?

My only complaint would be the general condition of the actual building Purvine, but as the new engineering building will be built, I can hope improvement in QoL for future students

Honestly, the transition to purely online classes was not that smooth, but I have a feeling it's because this is the first time something like this has happened.

For Computer Engineers, maybe add a beginning level app development class or a wireless/bluetooth programming class.

Q BCMP 8 - Please indicate your level of satisfaction with advising in the program.



■ Very dissatisfied
 ■ Dissatisfied
 ■ Satisfied
 ■ Very satisfied

#	Question	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied	Total
1	Availability of faculty advisor	0.00% 0	0.00% 0	66.67% 2	33.33% 1	3
2	Time faculty advisor spent with you	0.00% 0	0.00% 0	33.33% 1	66.67% 2	3
3	Faculty advisor understanding of the requirements of the major	0.00% 0	0.00% 0	33.33% 1	66.67% 2	3
4	Faculty advisor's assistance in choosing courses	0.00% 0	0.00% 0	66.67% 2	33.33% 1	3
5	Faculty advisor's assistance in understanding the options in different Oregon Tech majors	0.00% 0	0.00% 0	66.67% 2	33.33% 1	3
6	Faculty advisor's assistance in helping with career development and career opportunities	0.00% 0	0.00% 0	100.00% 3	0.00% 0	3
7	Faculty advisor's assistance in recommending externships/internships	0.00% 0	33.33% 1	33.33% 1	33.33% 1	3
8	Faculty advisor's assistance in understanding the requirements for graduate school	0.00% 0	0.00% 0	50.00% 1	50.00% 1	2

Q BCMP 9 - Do you have any comments about advising?

Do you have any comments about advising?

Not much related to graduate school except asking if we are interested in attending.

Q BCMP 10 - Please provide feedback on the Computer Systems Engineering Technology faculty as a whole.



■ Strongly Agree
 ■ Agree
 ■ Disagree
 ■ Strongly Disagree

#	Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Total
1	Faculty are fair	0.00%	100.00%	0.00%	0.00%	3
2	Faculty are demanding	33.33%	33.33%	33.33%	0.00%	3
3	Faculty are helpful	0.00%	100.00%	0.00%	0.00%	3
4	Faculty help you understand how what are you learning could be applied	33.33%	66.67%	0.00%	0.00%	3
5	faculty help you develop intellectually	33.33%	66.67%	0.00%	0.00%	3
6	Faculty make courses interesting	66.67%	33.33%	0.00%	0.00%	3
7	Faculty makes courses relevant	66.67%	33.33%	0.00%	0.00%	3

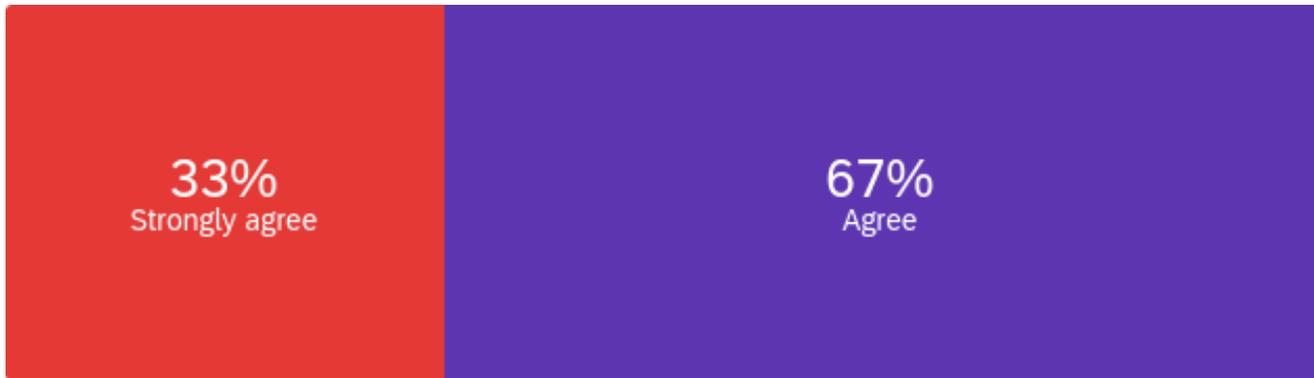
Q BCMP 11 - Please provide feedback about the Computer Systems Engineering Technology programs by indicating how much you agree with each one of the following statements.



■ Strong agree
 ■ Agree
 ■ Disagree
 ■ Strong disagree

#	Question	Strong agree	Agree	Disagree	Strong disagree	Total
1	Curriculum provides sufficient depth of information about specific topics	0.00%	100.00%	0.00%	0.00%	3
2	Curriculum provides sufficient breadth of information	0.00%	100.00%	0.00%	0.00%	3
3	Curriculum provides courses that meet your interests	66.67%	33.33%	0.00%	0.00%	3
4	Courses are available as needed	0.00%	33.33%	66.67%	0.00%	3
5	Curriculum provides opportunities for hands-on experiences	33.33%	66.67%	0.00%	0.00%	3
6	Lower division courses provide adequate foundation for upper division courses	0.00%	100.00%	0.00%	0.00%	3

Q BCMP 12 - Please indicate your level of agreement with the following statements about the laboratories in the Computer Systems Engineering Technology programs.



■ Strongly agree
 ■ Agree
 ■ Disagree
 ■ Strongly disagree

#	Question	Strongly agree		Agree		Disagree		Strongly disagree		Total
1	The lab component of the courses was helpful for understanding course material	33.33%	1	66.67%	2	0.00%	0	0.00%	0	3
2	The performance of the computer systems in the laboratory was sufficient	0.00%	0	100.00%	3	0.00%	0	0.00%	0	3

Q BCMP 13 - What have been the three best things about your major? These might be experience, particular courses or professors, general characteristics or features of the program--anything at all that was important to you.

What have been the three best things about your major? These might be experience, particular courses or professors, general characteristics or features of the program--anything at all that was important to you.

Small class sizes enable casual bonds between students and faculty

Learning how to code in different coding languages. Learning about the computer and embedded systems. Meeting and interacting with the other computer students and professors.

Q BCMP 14 - What have been the three worst things about your major? These might be experience, particular courses or professors, general characteristics or features of the program--anything at all that was important to you.

What have been the three worst things about your major? These might be experience, particular courses or professors, general characteristics or features of the program--anything at all that was important to you.

Falling behind in CST 126 when a professor was removed halfway through the term and little support was offered to the students, other than an easy pass, which led to many students struggling in CST 136 further on.

Had a shaky foundation with programming classes. Still have some feelings in which I feel inadequate for working in the industry. Unsure of what I want to do for the future, such as focus on a specific field or be more generalist.

Q BCMP 15 - What are one or two specific things we could do to improve your major?

What are one or two specific things we could do to improve your major?

Greater support for students in CST 116 who have little programming experience in programming.

Give more feedback on major class projects. Be more thorough on subject material before moving on to the hands on lab.

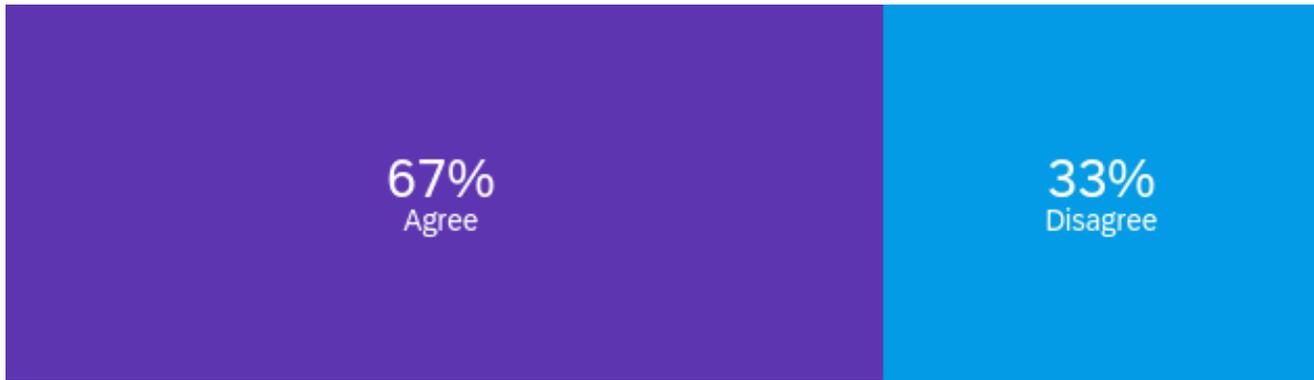
Q BCMP 16 - Please comment about department activities Movie night, game night, registration BBQ, etc.

Please comment about department activities Movie night, game night, registration BBQ, etc.

Registration barbecue will always remain memorable due to the fun and casual time for the awkward engineering majors.

Liked the events that I did attend, though I seemed to lack the time to attend as much events as I wanted to.

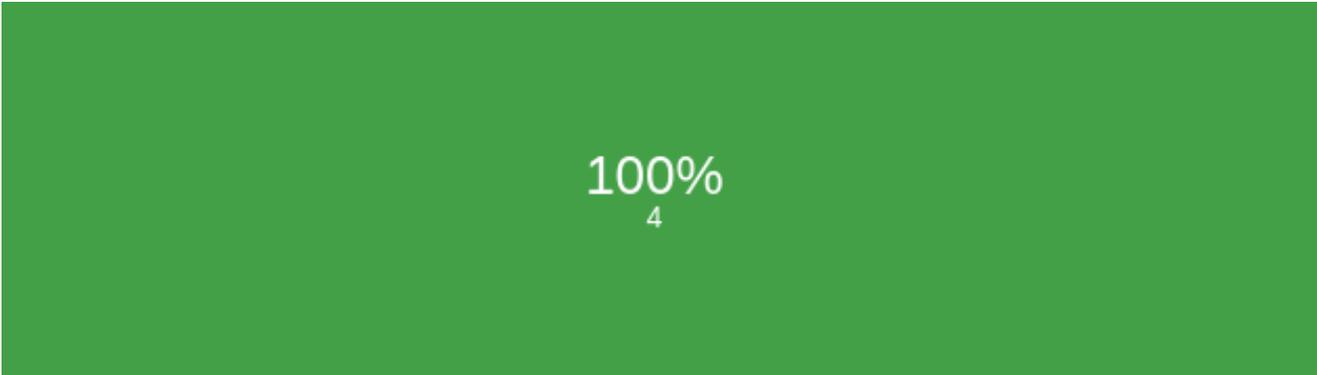
Q BCMP 17 - Please indicate your level of agreement with the following statements about your ability in Computer Engineering Technology ('Hardware') labs. I have adequate ability to:



■ Strongly agree
 ■ Agree
 ■ Disagree
 ■ Strongly disagree

#	Question	Strongly agree	Agree	Disagree	Strongly disagree	Total
1	Design, prototype and debug digital and microprocessor systems	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
2	Test and analyze problems in digital and microprocessor systems	33.33% 1	66.67% 2	0.00% 0	0.00% 0	3
3	Write and debug software for microprocessor systems	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
4	Write and debug HDL (i.e. Verilog) for digital systems	0.00% 0	66.67% 2	33.33% 1	0.00% 0	3
5	Use CAE design, debug and simulation software tools in the lab (i.e. Quartus, MPLab etc.)	0.00% 0	100.00% 3	0.00% 0	0.00% 0	3
6	Use test equipment in the lab (i.e. Oscilloscopes, Logic, Analyzers, etc.)	0.00% 0	100.00% 3	0.00% 0	0.00% 0	3
7	The lab test equipment was appropriate for the lab experiments	33.33% 1	66.67% 2	0.00% 0	0.00% 0	3

Q BCMP 18 - What is your overall rating of the quality of education you received at Oregon Tech?



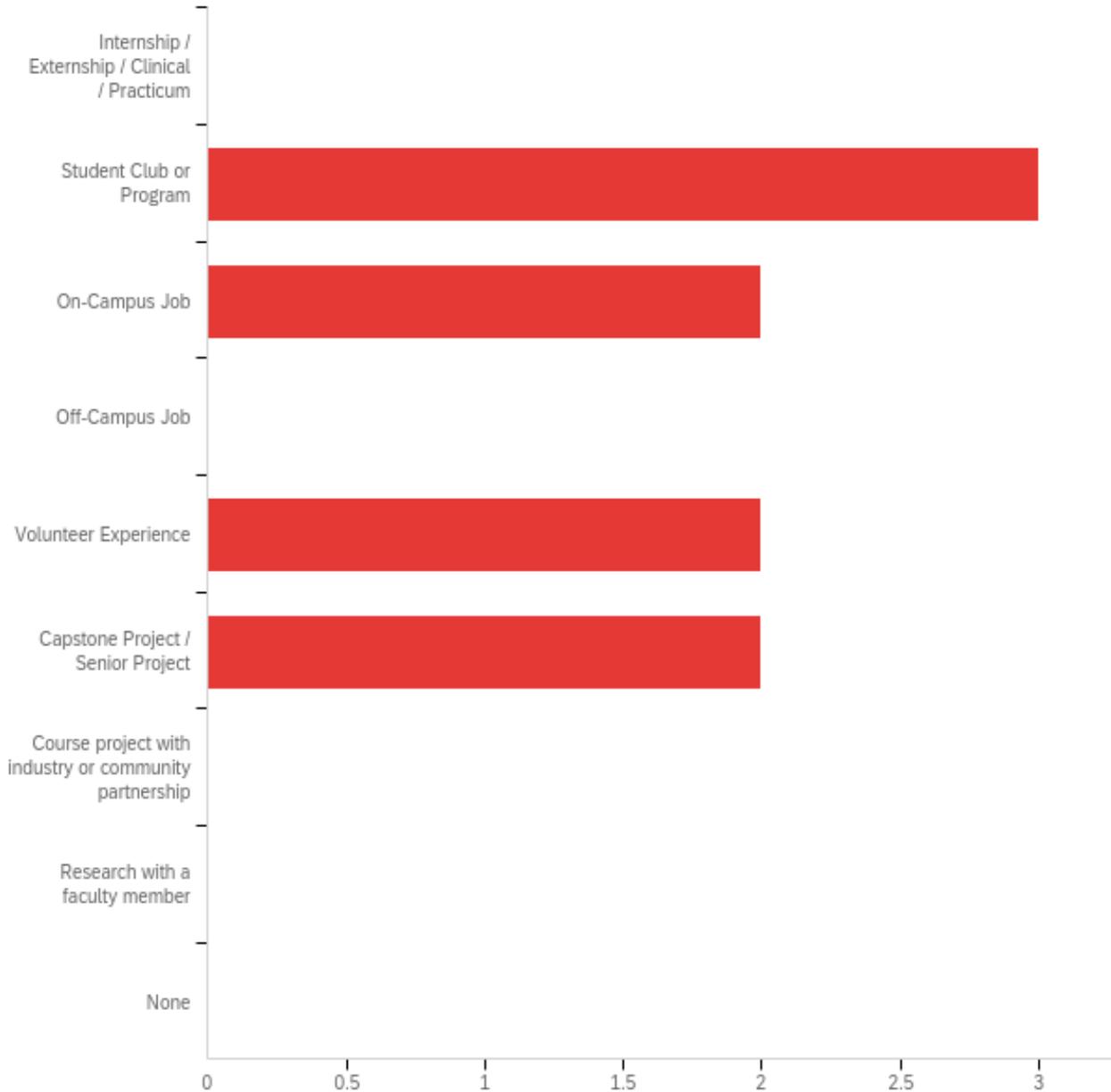
1 2 3 4 5

#	Answer	%	Count
1	1	0.00%	0
2	2	0.00%	0
3	3	0.00%	0
4	4	100.00%	2
5	5	0.00%	0
	Total	100%	2

Q BCMP 19 - Do you have any other comments about your time at Oregon Tech?

Do you have any other comments about your time at Oregon Tech?

Q Experiential Learning 1 - Oregon Tech recognizes that learning occurs in a variety of venues and experiences. Please check all of the following learning experiences you participated in while enrolled as a student at Oregon Tech.



#	Answer	%	Count
1	Internship / Externship / Clinical / Practicum	0.00%	0
4	Student Club or Program	33.33%	3
5	On-Campus Job	22.22%	2
6	Off-Campus Job	0.00%	0

8	Volunteer Experience	22.22%	2
10	Capstone Project / Senior Project	22.22%	2
12	Course project with industry or community partnership	0.00%	0
13	Research with a faculty member	0.00%	0
20	None	0.00%	0
	Total	100%	9