Oregon TECH

2024-25
Master of Science Natural Resources

Submitter: Christy VanRooyen
Department Chair: Dr. Nate Bickford

Section 1 – Program Mission

Program Mission: The Natural Resources Master's Program (MSNR) at Oregon Tech prepares students to apply techniques of scientific research to real-world biological problems encountered in business, industry, government, and education.

Our world, locally and globally, faces unprecedented environmental challenges. In the Klamath Basin we are faced with managing millions of acres of private, state, and federal lands to reduce catastrophic wildfire risk, improve water quality, maintain biodiversity, and produce valuable natural resources. Furthermore, many federal and state natural resource agencies have an aging workforce that is retiring, leading to significant vacancies at many agencies. This program aims to address these challenges.

The Natural Resources Master's Program is open to all applicants, regardless of their undergraduate field of study. However, the following criteria must be met:

- **Baccalaureate Degree**: Graduate students must have a bachelor's degree from an accredited university or institution. The degree should include basic courses in biology, ecology, and at least 12 credits of upper-division science.
- Minimum **3.0 overall GPA**
- **2 Letters of recommendation** addressing the student's qualifications and aptitude to succeed in the program.
- A letter of support from a potential **faculty mentor** who will act as the PI for their thesis.

Through the Natural Sciences (NSC) Department and the Environmental Sciences undergraduate program, the MSNR program offers both a 3-plus-2 year path for current undergraduates in ENV and a standalone 2-year program for students coming in with a relevant undergraduate degree from another institution. The program was particularly designed to educate our students, with industry projects providing valuable opportunities to learn, while at the same time solving important issues.

Graduates can expect to find employment in federal, state, and tribal government agencies, non-governmental organizations (NGOs), and education and research institutions.

Mission Alignment: The MSNR program, mission closely aligns with the Oregon Tech mission: *Oregon Institute of Technology (Oregon Tech), Oregon's public polytechnic university, offers innovative, professionally-focused undergraduate and graduate degree programs in the areas of engineering, health, business, technology, and applied arts and sciences. To foster student and graduate success, the university provides a hands-on, project-based learning environment and emphasizes innovation, scholarship, and applied research. With a commitment to diversity and leadership development, Oregon Tech offers statewide educational opportunities and technical expertise to meet current and emerging needs of Oregonians as well as other national and international constituents.*

Our students experience active and applied learning in natural environments. They collaborate with agencies and community partners to develop their original thesis projects to inform data driven natural resource management decisions. The program offers graduate teaching and research assistantships which result in leadership development for the selected candidates. MSNR faculty and students engage with professional communities through publications and conference presentations. These research and scholarly activities are in direct alignment with Pillars II & III of Oregon Tech's strategic plan which state:

> Pillar II COMMITMENT TO INNOVATION: Oregon Tech strives to be entrepreneurial and on the leading edge of student engagement, innovative teaching, and collaborative research.

Pillar III COMMITMENT TO COMMUNITY: Oregon Tech is an active member of the communities that it serves. Students, faculty, and staff are encouraged to contribute to their physical, professional, scholarly, and social communities via leadership and active participation through their academic and professional expertise.

Section 2 – Program Student Learning Outcomes

The program mission and student learning outcomes were developed under the guidance of an advisory committee made up of regional natural resource professionals. The Program Student Learning Outcomes (PSLOs) are currently in a draft state and will be finalized this academic year.

Program student Learning Outcomes:

- ✓ PSLO 1 : Graduate students will demonstrate conceptual and applied knowledge of the ecology, conservation, and management of natural resources through the completion of an original, empirical thesis.
- ✓ PSLO 2: Graduate students will generate viable questions, pose reasonable hypotheses, and design a robust observational or experimental study within their field of expertise.
- ✓ PSLO 3: Graduate students will analyze data using current and relevant methodologies and effectively communicate their results with appropriate data visualizations.
- ✓ PSLO 4: Graduate students will demonstrate professional level oral and written scientific communication skills through their thesis defense and project manuscript.
- ✓ PSLO 5: Graduate students will effectively synthesize and critique scientific work and writing.

Section 3 – Curriculum Map

Curriculum Map:

Given that this is a master program, the expectation is that students will exhibit work at the practicing and capstone levels and that the foundational background was laid during their undergraduate education.

Table 1: Mapping of PSLOs to the MSNR curriculum. Level of application: F – Foundational P – Practicing C - Capstone

Program	PSLO 1	PSLO 2	PSLO3	PSLO4	PSLO5
COURSE					
BIO 501	P	P		P	P
BIO 510	P				P
BIO 511	P	P			P
ENV 534	P		P		
ENV 535	C	P	C		
BIO 595	C	C	C	C	C
BIO 537	C		C		

Section 4 – Assessment Cycle

Assessment data is collected annually followed by a review of results and development of actions plans as necessary. Given that this is a new program and last fall (2024) was the first year students were admitted, 2025 will be our first official year of data collection.

Table 2: Assessment Cycle for MSNR program.

PSLO	**2025-26**	**2026-27**	**2027-28**
PSLO 1	Assessed through graduation and retention rates.	Assessed through graduation and retention rates.	Assessed through graduation and retention rates.
PSLO 2	BIO 501 – Intro to Grad Studies: Project Proposal BIO 595 – Thesis Defense and Manuscript	BIO 501 – Intro to Grad Studies: Project Proposal BIO 595 – Thesis Defense and Manuscript	BIO 501 – Intro to Grad Studies: Project Proposal BIO 595 – Thesis Defense and Manuscript
PSLO 3	BIO 537– Advanced data Analysis II. Final Analysis BIO 537 – Completed thesis analysis.	BIO 537– Advanced data Analysis II. Final Analysis BIO 537 – Completed thesis analysis.	BIO 537– Advanced data Analysis II. Final Analysis BIO 537 – Completed thesis analysis.
PSLO 4	Project Proposal - assessed by committee Thesis Defense and manuscript – assessed by committee	Project Proposal - assessed by committee Thesis Defense and manuscript – assessed by committee	Project Proposal - assessed by committee Thesis Defense and manuscript – assessed by committee
PSLO 5	BIO 501 – Intro to Grad Studies: Background research BIO 510 – Special Topics: paper reviews BIO 511 – Paper review	BIO 501 – Intro to Grad Studies: Background research BIO 510 – Special Topics: paper reviews BIO 511- Paper review	BIO 501 – Intro to Grad Studies: Background research BIO 510 – Special Topics: paper reviews BIO 511- Paper review

Section 5 – Assessment Data Collection Processes

Performance Target: We are currently working on developing rubrics and establishing the performance targets for assessment.

Activity:

BIO 501 – Intro to Grad Studies

Background research for thesis – assessed by course instructor.

Project Proposal - assessed by course instructor and thesis committee.

BIO 510 – Special Topics

Review of Journal Article – assessed by course instructor which varies by term and topic.

Graduation and retention Rates – data from Equity Dashboards. Will be collected by the program director.

Thesis Defense and Manuscript – Assessed by thesis committee.

BIO 534 – Final analysis – assessed by course instructor

BIO 537 – Graduate thesis analysis – assessed by course instructor and thesis committee.

BIO 595 – Thesis committee will assess their final manuscript and defense of their thesis.

Other artifacts are still being determined as courses are developed and taught for the first time.

Sample: Under development
Accountability:
Thesis committee groups and instructors will be given rubrics and deadlines for assessment. These will be provided by the program director who is working with all MSNR faculty to develop these tools.
Representation:
Rubric: Rubrics for the PSLOs are being finalized. See the working drafts in Appendix A.

Section 6 – Assessment Data and Interpretations

As this is a new program and assessment data has not been collected yet, we have no data to report at this time.

Table 3: MSNR Assessment Data

Performance Criteria	Assessment Methods	Performance Target	Results	Interpretation
Learning Outcomes				
PSLO1				
PSLO2				
PSLO3				
PSLO4				
PSLO5				
Student Success Indicators				
Graduation Rate				
Retention				
Post Graduation Success				
Program Certification % (If needed for accreditation)				

Evidence of Improvement in Student Learning

Table 4: Comparison of Assessment Data over time.

Performance Criteria	Previous Action Plan	Previous Data	Current Data	Interpretation
PSLO1				
PSLO2				
PSLO3				
PSLO4				
PSLO5				
Graduation Rate				
Retention				
Post-Graduation Success				
DFWI				

Section 7 – Data-driven Action Plans:

Our action plan for the 2025-26 year is to finish developing our assessment tools and processes and then implement our first round of data collection. Next year we will report our first set of findings and new action plans.

Section 8 – Closing the Loop: Reflection on previous work

New program, with no prior work to reflect on.

Appendix A - Rubrics

PSLO 2: Graduate students will generate viable questions, pose reasonable hypotheses, and design a robust observational or experimental study within their field of expertise.

Criteria	Exceeds Expectations (4)	Meets Expectations (3)	Approaching Expectations (2)	Below Expectations (1)
Research Question	Question is original, significant, and clearly grounded in current literature; demonstrates deep understanding of the field and potential for advancing knowledge.	Question is clear, relevant, and supported by literature; demonstrates solid understanding of the field.	Question is somewhat clear but lacks depth, specificity, or clear connection to existing literature.	Question is vague, unfocused, or unrelated to disciplinary context.
Hypothesis or Research Goals Formulation	Hypothesis or goals are logically derived from the research question, testable, clearly articulated, and reflects sophisticated understanding of variables and mechanisms.	Hypothesis or goals are clearly stated, testable, and reasonably derived from the research question.	Hypothesis or goals somewhat testable but lacks clarity, logical grounding, or connection to the question.	Hypothesis or goals are missing, unclear, or not testable.
Study Design	Study design is rigorous, innovative, and well-justified; demonstrates deep methodological understanding; effectively controls for confounding factors; includes clear rationale for sample, data collection, and analysis methods.	Study design is appropriate, coherent, and feasible; demonstrates solid understanding of research methods; includes rationale for key choices.	Study design is partially appropriate but lacks clarity, coherence, or key methodological justifications.	Study design is inappropriate, incomplete, or poorly justified; demonstrates limited methodological understanding.

PSLO 2: Graduate students will generate viable questions, pose reasonable hypotheses, and design a robust observational or experimental study within their field of expertise.

Feasibility and Ethical Considerations	Design demonstrates thorough feasibility planning and clear attention to ethical standards relevant to the discipline.	Design is feasible and reflects awareness of ethical considerations.	Feasibility or ethical issues are partially addressed but need refinement.	Feasibility and ethical considerations are not addressed or inappropriate.

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PSLO 3: Graduate students will analyze data using current and relevant methodologies and effectively communicate their results with appropriate data visualizations.

Criteria	Exceeds Expectations (4)	Meets Expectations (3)	Approaching Expectations (2)	Below Expectations (1)
Selection and Application of Methodologies	Chooses and correctly applies the most appropriate and current analytical techniques; demonstrates sophisticated understanding of methodological principles and their relevance to the research question.	Chooses and applies appropriate analytical methods; demonstrates solid understanding of the rationale and procedures.	Uses partially appropriate methods or demonstrates limited understanding of their assumptions or application.	Uses inappropriate, outdated, or incorrect analytical methods; demonstrates minimal understanding of methodological requirements.
Interpretation and Communication of Results	Results are interpreted with insight and depth; conclusions are logically derived from data; demonstrates strong integration of quantitative and conceptual reasoning.	Results are clearly explained and logically connected to the data; interpretations are appropriate.	Results are presented but lack clarity or depth of interpretation; some conclusions are weakly supported.	Results are misinterpreted, inconsistent with the data, or poorly communicated.
Accuracy and Rigor of Analysis	Analysis is thorough, accurate, and replicable; demonstrates critical evaluation of data quality, limitations, and statistical assumptions.	Analysis is accurate and sufficiently rigorous; appropriately interprets results with minor issues in depth or precision.	Analysis contains minor errors, omissions, or lacks sufficient depth or rigor.	Analysis contains significant errors, misinterpretations, or lacks analytical coherence.

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PSLO 3: Graduate students will analyze data using current and relevant methodologies and effectively communicate their results with appropriate data visualizations.

Use of Data Visualization	Visualizations are clear, well-designed, and enhance understanding of the data and conclusions; follows disciplinary standards for accuracy, labeling, and aesthetics.	Visualizations are appropriate, accurate, and generally clear; effectively support the presentation of results.	Visualizations are present but lack clarity, proper labeling, or effective communication.	Visualizations are missing, inaccurate, or misleading.

PSLO 4: Graduate students will demonstrate professional level oral and written scientific communication skills through their thesis defense and project manuscript.

Criteria	Exemplary (4)	Proficient (3)	Developing (2)	Beginning (1)
Organization & Structure	Thesis is logically organized, with clear introduction, methods, results, and conclusions sections. Arguments and ideas flow seamlessly and build a coherent narrative.	Overall structure is logical and clear, though transitions or flow may occasionally be uneven.	Organization is apparent but lacks clarity or coherence in parts; ideas may be loosely connected.	Organization is unclear or confusing; difficult to follow argument or main points.
Clarity & Precision of Communication	Writing is exceptionally clear, concise, and precise. Technical terms are used appropriately and explained for the intended audience.	Communication is clear with minor lapses in precision or terminology use.	Communication occasionally lacks clarity or includes imprecise terminology or explanations.	Writing and/or speech are unclear, vague, or filled with jargon without explanation.
Writing Mechanics & Style (Written Component)	Writing is polished and professional with no grammatical or typographical errors.	Writing is mostly clear and correct; minor grammar or style issues.	Frequent mechanical or stylistic errors that distract from content.	Writing contains numerous errors and lacks academic tone or professionalism.
Engagement & Delivery (Oral Component)	Presentation is confident, engaging, and demonstrates mastery. Maintains audience	Delivery is clear and confident; minor issues with pacing or engagement.	Presentation is understandable but lacks energy,	Delivery is difficult to follow due to poor pacing, unclear

	interest with effective pacing, tone, and body language.		confidence, or consistent delivery.	speech, or lack of confidence.
Scientific Content & Accuracy	Content is scientifically sound, accurate, and reflects deep understanding of the field. All claims are well-supported by evidence.	Content is accurate and demonstrates solid understanding; minor inaccuracies or gaps in reasoning.	Some inaccuracies or misunderstandings evident; limited depth of analysis.	Major inaccuracies or misconceptions present; demonstrates weak grasp of subject matter.
Response to Questions & Feedback	Responds to questions thoughtfully, accurately, and demonstrates ability to think critically and synthesize information.	Responds accurately to most questions; shows understanding but may lack depth in some responses.	Provides partial or uncertain responses; limited ability to extend discussion.	Struggles to answer most questions; responses indicate minimal understanding

Criteria	Exemplary (4)	Proficient (3)	Developing (2)	Beginning (1)
Comprehension and Contextualization	Demonstrates a deep and comprehensive understanding of the scientific literature; accurately situates works within the broader field and articulates how they contribute to existing knowledge.	Demonstrates solid understanding of the literature; situates works within the field with minor gaps in contextualization.	Demonstrates partial understanding of key literature; context is superficial or incomplete.	Shows limited understanding of scientific works; context and relevance are unclear or incorrect.
Synthesis of Information	Integrates diverse sources seamlessly to identify trends, gaps, and connections; develops a coherent and original synthesis that advances understanding.	Integrates multiple sources effectively, identifying general themes and relationships; synthesis is accurate and mostly cohesive.	Attempts to integrate sources but synthesis is fragmented or overly descriptive; limited connections between ideas.	Summarizes sources individually with little or no integration or synthesis.
Critical Evaluation	Provides insightful, evidence-based critiques that assess methodology, interpretation, and significance; demonstrates high-level analytical reasoning.	Provides thoughtful critiques with clear reasoning; addresses key strengths and limitations of studies.	Offers limited critique focused mainly on surface-level features; lacks depth or consistency in evaluation.	Provides minimal or inaccurate critique; relies on opinion rather than evidence.
Use of Evidence and Support	Critiques are consistently supported by relevant, high-quality evidence from the literature; demonstrates discernment in source selection.	Uses appropriate and relevant sources to support analysis and critiques; minor lapses in justification.	Uses some supporting evidence but sources may be limited or inconsistently applied.	Provides few or inappropriate sources; assertions are unsupported.

Organization and Clarity of Argument	Presents ideas in a logical, coherent, and persuasive manner; transitions effectively guide the reader through the synthesis and critique.	Organization is clear and generally logical; argument is coherent with minor issues in flow or transitions.	Organization is inconsistent; argument may be unclear or lack strong logical connections.	Organization is weak; ideas are disjointed or difficult to follow.

Appendix B - Artifacts