

Docket Item:

University Program Approval: Portland State University, Professional Science Master's (P.M.S.) in Applied Geoscience.

Summary:

Portland State University proposes a new degree program leading to a P.M.S. in Applied Geoscience. The statewide Provosts' Council has unanimously recommended approval. Higher Education Coordinating Commission (HECC) staff completed a review of the proposed program. After analysis, HECC staff recommends approval of the program as proposed.

Staff Recommendation:

The HECC recommends the adoption of the following resolution:

RESOLVED, that the Higher Education Coordinating Commission approve the following program:

P.M.S. in Applied Geoscience at Portland State University.



Proposal for a New Academic Program

Institution: Portland State University

College/School: College of Liberal Arts and Sciences

Department/Program Name: Geology

Degree and Program Title: Professional Science Master's (P.S.M.) in Applied Geoscience

1. Program Description

- a. Proposed Classification of Instructional Programs (CIP) number.

40.0601 Geology/Earth Science, General

- b. Brief overview (1-2 paragraphs) of the proposed program, including its disciplinary foundations and connections; program objectives; programmatic focus; degree, certificate, minor, and concentrations offered.

The Professional Science Master's (PSM) in Applied Geoscience provides practicing geologists and post-baccalaureate students an opportunity to upgrade their geoscience credentials in an accessible way, to obtain skills relevant to professional geologists. This degree includes two common core courses, G 561 Research Methods – Writing, and G 523 Data Analysis. The coursework foundation of the Professional Master's degree centers on the completion of two Geology Certificate options in (1) Engineering Geology, (2) Environmental Geology and (3) Hydrogeology. We plan to give credit for optional internships and/or research projects with county, state and federal agencies, and private geologic consulting firms when possible, though the primary degree path requires only coursework. The proposed certificate-based framework provides formal recognition of work completed even if a student does not complete degree requirements. A professional development component of this degree requires students complete four credits of courses outside the department, from the Environmental Science and Management (ESM), Geography (Geog), Engineering Technology Management (ETM), or Public Administration (PA) Departments. This proposed degree will draw on classes from multiple departments/colleges, including ESM and Department of Geography within CLAS, as well as the Department of Civil and Environmental Engineering (CEE).

Disciplinary foundations and connections of this program are established in part through an advisory board of Geology professionals from private firms, state and federal agencies that have provided us with valuable input on updates to the Geology Certificates. We have met with an advisory board of practicing professionals regarding the certificates and the proposed program, and have solicited responses to a questionnaire from a variety of firms and outside organizations that can serve as partners for internships and projects.

- c. Course of study – proposed curriculum, including course numbers, titles, and credit hours.

Prerequisites

- BA or BS in Geology or Earth Science

OR

- BA or BS in a physical science (e.g. Chemistry, Physics) with 5 years of experience in geoscience related industry. Taking G 434 Structure AND G 318 Surface Processes OR G 435 Sedimentology and Stratigraphy may substitute for industry experience.

Curriculum Requirements (48 Total Credits)

1. CORE SKILLS: these courses should be completed as a requirement within the Certificates, below.
 - a. G 651 Scientific Writing (Research Methods II)
 - b. G 523 Data Analysis (Research Methods III)
2. TWO CERTIFICATES FROM THE FOLLOWING LIST (36 elective credits) **see certificates for details.*
 - a. Engineering Geology
 - b. Environmental Geology
 - c. Hydrogeology
3. PROFESSIONAL DEVELOPMENT (total 4 credits)

- ESM 551 Project Management for Scientists (4)
- ESM 555 Science Communication (1)
- ESM 556 Advanced Science Communication Skills (1)
- ESM 557 Science, Media and the Public: Working with the Media to Create Effective Scientific Messages (1)
- ETM 522 Communication and Team Building (4)
- ETM 545 Project Management (4)
- PA 555 Program Evaluation and Management (3)
- PA 564 Environmental Policy and Administration (3)
- PA 565 Natural Resource Policy and Administration (3)
- PA 566 Water Resources Policy and Administration (3)
- PA 567 Energy Resources Policy and Administration (3)
- ESM 517 Applied Watershed Restoration (4)
- ESM 534 Business Environmental Management Economics (4)
- ESM 535 Natural Resource Policy and Management (4)
- ESM 553 Environmental Regulation and Non-regulatory approaches (3)
- ESM 587 Environmental Justice (4)
- ESM 588 Environmental Sustainability (4)
- ESM 593 Advanced Environmental Science Lab (2)
- Geog 512 Global Climate Change Science and Socio-environmental Impact Assessment (4)
- Geog 513 Disturbance Biogeography of Pacific Northwest (4)
- Geog 540/ESM 540 The Ecology and Management of Wildfire (4)
- Geog 545 Resource Management Topic (4)
- Geog 546 Water Resource Management (4)
- Geog 567 Community Resilience in Coupled Socio-Ecological Systems (4)

4. EXPERIENTIAL COMPONENT (total 8 credits)

Students may complete 8 credits of an internship or project, or 4 credits of an internship or project and 4 credits of graduate-level Field Geology.

- a. INTERNSHIP OR PROJECT (4-8 elective credits)

- i.* One to two terms of internship or project (4 – 8 credits).
 - ii.* At the beginning of the internship the student must meet with their employer or internship/project adviser to outline internship responsibilities and identify 2 to 3 major milestones. At the halfway point of the internship the student will complete a self-assessment based on the agreed upon milestones. At this time the internship/project adviser will complete a progress report to the PSU PSM faculty.
 - iii.* For a two-term internship or project, a second self-assessment and internship/project adviser progress report is required by the end of the first term.
 - iv.* An end of internship or project product is determined by employer or internship/project adviser (i.e. report, presentation).
 - v.* The student's internship/project adviser will provide a final evaluation of the student's internship/project experience.
 - vi.* The PSU PSM faculty committee will complete a pass/no pass assessment based upon the following: 1) Original internship responsibilities and milestones, 2) Mid-internship student self-assessment and internship/project adviser progress report. 3) End of internship product, 4) Final evaluation of the student's internship/project experience by the internship/project adviser.
- b. FIELD GEOLOGY (4 credits)*
 - i.* G 581 Field Geology, this course may be replaced with an equivalent graduate level field course from another institution pending faculty approval.
- d.* Manner in which the program will be delivered, including program location (if offered outside of the main campus), course scheduling, and the use of technology (for both on-campus and off-campus delivery).

This program is primarily in-person at PSU, however some portion of it could be accessed remotely as courses become available online. Remote course access and "attend anywhere" class formats will be permitted to increase flexibility for attendance.
- e.* Adequacy and quality of faculty delivering the program.

The proposed program is based on existing courses and Certificates in the Geology Department, as well as on courses in several other departments. The faculty that teach these courses, already meet the needs and standards of the individual departments and can include both full-time and part-time faculty.
- f.* Adequacy of faculty resources – full-time, part-time, adjunct.

There are a variety of faculty resources for the courses that make up the proposed degree. In Geology there are now six full-time TTF, two fixed-term faculty, as well as several adjuncts. No new resources are required to start delivery of the proposed program.
- g.* Other staff.

There are a variety of staff resources for the Departments that offer courses in the proposed degree. In Geology there are now 1.5 FTE staff positions.
- h.* Adequacy of facilities, library, and other resources.

The Portland State University Library holds sufficient sources to support the proposed Professional Master's of Science Degree in Applied Geosciences. The program will consist primarily of existing courses; thus, it should not require additional library resources to start. Currently, the Library has a number of books and journals that would support research students might undertake as part of their assignments or independently to accompany their work in the required courses.
- i.* Anticipated start date.

Fall 2022

2. Relationship to Mission and Goals

- a. Manner in which the proposed program supports the institution's mission, signature areas of focus, and strategic priorities.

The proposed degree directly contributes to the mission of PSU (<https://www.pdx.edu/portland-state-university-mission>). Through community engagement with internships, and flexible course choices and degree paths, the proposed degree will give students an accessible entry into the workplace of their chosen fields. The proposed degree will benefit businesses and organizations by giving them the workers they need, benefiting the local and regional economy.

- b. Manner in which the proposed program contributes to institutional and statewide goals for student access and diversity, quality learning, research, knowledge creation and innovation, and economic and cultural support of Oregon and its communities.

The program in development is the Geology Department's first Professional Science Master's (PSM). It is designed to allow practicing geoscientists and post-baccalaureate students of diverse backgrounds an opportunity to upgrade their geoscience credentials in an accessible way, while also filling the needs of prospective employers. The proposed degree will serve as a bridge between academia and the workforce, broadly advancing workforce development in the geosciences. The program provides economic and cultural support for regional businesses by offering graduates who have attained suitable skills for different types of jobs.

The proposed degree intentionally includes a varied, holistic coursework that will allow students to become exposed to diverse skill sets, research, and service work depending on their interests and those of the external partners and potential employers. As part of the degree, students with diverse backgrounds will engage in STEM fields (as represented by coursework offered through the Geology Certificates, and through the Geology, Environmental Science and Management, and Engineering and Technology Management departments), furthering Portland State's commitment to fostering equity and diversity and STEM education.

- c. Manner in which the program meets regional or statewide needs and enhances the state's capacity to:
 - i. improve educational attainment in the region and state;
 - ii. respond effectively to social, economic, and environmental challenges and opportunities; and
 - iii. address civic and cultural demands of citizenship.

Students pursuing the proposed degree will choose a course of study that requires them to obtain two of three graduate certificates, including Engineering Geology, Environmental Geology, and Hydrogeology. Each certificate track will expose students to important societal, economic, and environmental problems in their subject areas. By combining coursework with internships, degree graduates will obtain both conceptual and practical knowledge that will enhance opportunities for them to become culturally and scientifically literate and good stewards of the planet.

3. Accreditation

- a. Accrediting body or professional society that has established standards in the area in which the program lies, if applicable.

The program will reside within Portland State University, which is accredited.

- b. Ability of the program to meet professional accreditation standards. If the program does not or cannot meet those standards, the proposal should identify the area(s) in which it is deficient and indicate steps needed to qualify the program for accreditation and date by which it would be expected to be fully accredited.

The program will reside within Portland State University, which is accredited. For professional geologists, the degree will support the pursuit of licensure in Oregon and Washington.

- c. If the proposed program is a graduate program in which the institution offers an undergraduate program, proposal should identify whether or not the undergraduate program is accredited and, if not, what would be required to qualify it for accreditation.

The program will reside within Portland State University, which is accredited.

- d. If accreditation is a goal, the proposal should identify the steps being taken to achieve accreditation. If the program is not seeking accreditation, the proposal should indicate why it is not.

The program will reside within Portland State University, which is accredited.

4. Need

- a. Anticipated fall term headcount and FTE enrollment over each of the next five years.

Anticipated student enrollment in the program, based on informal expressions of interests from students and on the likely time needed to advertise the program, is as follows: Fall 2022 = 3, Fall 2023 = 4, Fall 2024 = 7, Fall 2025 = 10, Fall 2026 = 13, total over 5 years = 37.

- b. Expected degrees/certificates produced over the next five years.

Based on simplifying assumptions that include a 2-year course of study for most students in the proposed program and 100% completion rates, and taking into account the one student that has started early, the following number of degrees over the next five years are estimated: Spring 2022 = 1, Spring 2023 = 2, Spring 2024 = 4, Spring 2025 = 7, Spring 2026 = 10, total over 5 years = 24.

- c. Characteristics of students to be served (resident/nonresident/international; traditional/nontraditional; full-time/part-time, etc.).

The proposed degree is designed to appeal to a variety of students that can fit both traditional categories (full time MS students that are primarily not in the workforce) as well as non-traditional students (mostly part-time MS students who are already in the workforce and looking to advance their careers).

- d. Evidence of market demand.

A market analysis was performed for Portland State, performed by Burning Glass Technologies in 2020 and updated in 2021. The updated analysis is included at the end of this proposal, and is summarized below. Also considered are data from the Bureau of Labor Statistics on Geoscience jobs throughout the country, as recently summarized by the American Geosciences Institute Workforce Report (2018).

The market analysis shows that in the Portland metro area (Portland, Hillsboro, Vancouver), 56 job postings in the selected program of study were made between 4/1/2020 and 3/31/2021. This compares to 29 MS degrees conferred in 2019 for the top four regional institutions, including 6 degrees conferred from PSU. This indicates current job demand in the program of study is twice as large as the number of MS graduates overall, and eight times larger than the number of MS graduates from PSU. The jobs are being filled by students mostly with BS degrees (58%) and MS degrees (30%), and most job postings advertised 0-2 years of required job experience. This suggests that BS graduate or post-baccalaureate students with extra skill sets and internships obtained in the proposed PSM could be very competitive in the regional job market.

The median salary in the postings is \$83K, relative to an average living wage in the area of \$32K. This indicates good-wage jobs in this discipline.

Beyond the local region, the analysis also indicates much larger demand for similar geoscience jobs in California (#1 in the nation for posting demand) and Texas (#2 in the nation). More generally, the Bureau of Labor Statistics (BLS) expects the number of geoscience full-time equivalents (FTE) to increase by 11% between 2016-2026. Based on retirements and current graduation rates alone, they expect a deficit of ~118,000 geoscience FTEs nationwide by 2026. According to the most recent American Geosciences Institute (AGI) Workforce Report (2018), hiring rates of geoscience master's students in the public sector (both state and federal) and in the environmental services industry have been growing nationwide.

- e. If the program's location is shared with another similar Oregon public university program, the proposal should provide externally validated evidence of need (e.g., surveys, focus groups, documented requests, occupational/employment statistics and forecasts).

Not applicable.

- f. Estimate the prospects for success of program graduates (employment or graduate school) and consideration of licensure, if appropriate. What are the expected career paths for students in this program?

The proposed degree is designed to provide students with skills and experiences that ultimately will make them more competitive in the workforce, both locally, regionally, and nationally. The Burning Glass market analysis report indicates that locally (Greater Portland Metro area), most job titles are for hydrologists and/or watershed modelers in the environmental and climate science occupation group, with projected growth of 8.2% between 2019-2028. These job titles and occupation groups would seem to match the program of study for the Environmental Geology and Hydrogeology certificates in the proposed degree.

The skills required by employers for the jobs are skill sets that will be reinforced in the proposed degree. This includes baseline skills, such as communication, research, creativity, self-starting, and writing; and varied top skills, including hydrology, data collection, quality and assurance, land management, and many others. This mix is consistent with the AGI Workforce Report which shows "non-technical" skills like project and time management are under high demand by employers but generally under-emphasized in geology master's degree programs. It is also reflected in survey data that indicates early career geoscientists generally wished they had more instruction in science communication, business, GIS, field skills, and writing, among others. Accordingly, we have intentionally included varied, holistic coursework in the proposed degree that will allow students to become exposed to diverse skill sets depending on their interests and those of the external partners and potential employers.

5. Outcomes and Quality Assessment

- a. Expected learning outcomes of the program.

The proposed degree will have learning outcomes that conform to those of the Geology graduate program. These include acquiring advanced knowledge, performing suitable methods of analysis, conducting original and responsible research, engaging in pedagogy, using appropriate communication skills, and exhibiting professionalism.

1. Learn background material relevant to sub-fields of Geology including Engineering Geology, Environmental Geology, and Hydrogeology.
2. Students will be able to describe the processes operating at and beneath the Earth's surface, how those processes create the Earth's landscape, and how humans affect and are affected by the processes
3. Students will be able to outline the broad physical and/or biological history of the planet and the evidence for that history

4. Students will be able to outline the regional geology of the Pacific Northwest United States and North America.
 5. Apply physics, chemistry, biology, and mathematics concepts in specialized graduate courses taken to complete Certificates in Engineering Geology, Environmental Geology, and Hydrogeology.
 6. Students will be able to use specific skills (e.g., map reading, field methods and observations, laboratory methods for analysis, image processing) to interpret spatial geological information, geological materials, history, and features.
 7. Students will be able to formulate and complete a program of independent research under the direction of the faculty.
 8. Students will be able to evaluate and explain critically fundamental Earth science literature and spatial data (e.g., photographs, maps, remotely sensed images, digital elevation models)
 9. Students will be able to present geological information clearly in written, graphic, and oral forms.
 10. Articulate the benefits and responsibilities of working as a member of a team, students will be able to communicate effectively with peers, as well as with individuals outside the discipline.
- b. Methods by which the learning outcomes will be assessed and used to improve curriculum and instruction.

For the proposed degree, successful completion of coursework and internships can be considered as evidence that learning objectives have been achieved. However, interim and final reports performed during internships, and assessments by students progressing through the degree path, will be evaluated for ways to improve learning outcomes.

Program performance for the new degree will be evaluated based on metrics on course completions, certificate completions, mid-term progress reports for internships, final evaluation reports for internships, time to complete completion of the degree, and success rates for licensing of professional geologists.

- c. Nature and level of research and/or scholarly work expected of program faculty; indicators of success in those areas.

Faculty in the Geology Department are expected to excel in their chosen work areas, engaging in suitable pedagogy and the mentoring of students, and performing service work for their departments, the university, and scientific discipline areas. Metrics include the completion of scientific publications, attendance of scientific conferences, obtaining grants, participating in suitable service work, level of public outreach, and advising of students. All faculty undergo periodic peer performance reviews to evaluate their scholarship.

6. Program Integration and Collaboration

- a. Closely related programs in this or other Oregon colleges and universities.

Other units within Portland State University have been and are now providing professional MS degrees which overlap but are distinct from the proposed degree.

Civil and Environmental Engineering: There is a coursework-only Master's of Engineering degree (MEng) with four focus areas, two of which have some disciplinary cross-over with our proposed degree (Geotechnical Engineering and Environmental and Water Resources Engineering). However, the core of their degree is engineering-focused, while ours is geology-focused.

Environmental Science and Management: There are two professional master's degrees: 1) Master's in Environmental Management (MEM), and 2) Professional Science Master's (PSM). Neither overlap with our proposed degree in terms of core curriculum.

Geography: Geography recently finalized an MS in GIS degree. Although some of the courses that are part of this degree are also available as electives in Geology's proposed program (e.g., GEOG 592 Advanced GIS is an elective in both the Environmental Geology and Engineering Geology electives), the Geography degree is focused on Geographic Information System courses that are not the focus of the proposed Geology Professional Science Master degree.

None of the major degree granting Universities in Oregon currently have Professional Science Master's (PSM) Geology degree programs. Oregon State University (OSU) offers a traditional MS degree in Geology, and an integrative MS degree with concentration in either Atmospheric, Geophysics, or Oceanography. OSU also offers a PSM in Environmental Science, which is more closely aligned with the PSM degree offered by the PSU ESM department. OSU also offers graduate certificates in GIS, Marine and water conflict management, and no graduate certificates in Geology or Earth Science. University of Oregon offers both traditional MA and MS options in Earth Science which requires independent research in one of 19 subdisciplines.

- b. Ways in which the program complements other similar programs in other Oregon institutions and other related programs at this institution. Proposal should identify the potential for collaboration.

Interdisciplinary collaboration is a potential outcome of the proposed degree, as it is based on classes from multiple departments/colleges. This includes courses from Environmental Science and Management (ESM), Geography, and Civil and Environmental Engineering as part of the certificate requirements. Professional development requirements of the proposed degree also will require students to complete coursework outside the department in ESM, Engineering Technology Management, or Public Administration.

- c. If applicable, proposal should state why this program may not be collaborating with existing similar programs.

Not applicable.

- d. Potential impacts on other programs.

Not applicable.

7. External Review

The proposed Professional Science Master's of Applied Geoscience is related to the approved MS in Geology and is based on three approved certificates in Geology (Engineering Geology, Environmental Geology, and Hydrogeology). The new program expands on the existing MS and certificates by including professional development courses focused on management and communication offered by other departmental units and by an experiential internship component with outside business and government partners. Although all coursework required for the degree is based on existing courses at PSU, the new degree is aimed more at enhancing the marketability of geoscientists who are either practicing in the field already or who are interested in doing so.

Given that the PSM is closely related to the existing MS in Geology and the three certificates, a market analysis was performed for Portland State in lieu of the External Review. This market analysis was performed by Burning Glass Technologies in 2020 and was updated in 2021. The updated analysis is attached and is summarized below. Also considered are data from the Bureau of Labor Statistics on Geoscience jobs throughout

the country, as recently summarized by the American Geosciences Institute Workforce Report (2018).

The market analysis shows that in the Portland metro area (Portland, Hillsboro, Vancouver), 56 job postings in the selected program of study were made between 4/1/2020 and 3/31/2021. This compares to 29 MS degrees conferred in 2019 for the top four regional institutions, including 6 degrees conferred from PSU. This indicates current job demand in the program of study is twice as large as the number of MS graduates overall, and eight times larger than the number of MS graduates from PSU. The jobs are being filled by students mostly with BS degrees (58%) and MS degrees (30%), and most job postings advertised 0-2 years of required job experience. This suggests that BS graduate or post-baccalaureate students with extra skill sets and internships obtained in the proposed PSM could be very competitive in the regional job market.

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Below is the full market analysis data provided by Burning Glass.

VALIDATE: EMPLOYMENT POTENTIAL

PROJECT CRITERIA

Validate	Programs
States	Oregon
Metro Areas (MSAs)	Portland-Vancouver-Hillsboro, OR-WA
Degree Level	Master's degree
Time Period	4/1/2020 - 3/31/2021
Selected Programs	Geochemistry (40.0602), Geochemistry and Petrology (40.0606), Geological and Earth Sciences/Geosciences, Other (40.0699), Geology/Earth Science, General (40.0601), Geophysics and Seismology (40.0603), Hydrology and Water Resources Science (40.0605), Oceanography, Chemical and Physical (40.0607), Paleontology (40.0604)
Career Outcomes mapped to Selected Programs of Study	Geophysicist, Geologist, Environmental Compliance Specialist, Physical / Geoscience Technician, Physical Scientist, Hydrologist

How Many Jobs are there for Graduates OF THIS PROGRAM?

For your project criteria, there were 56 job postings in the last 12 months.

Compared to:

- 510,559 total job postings in your selected location
- 38,728 total job postings requesting a Master's degree in your selected location

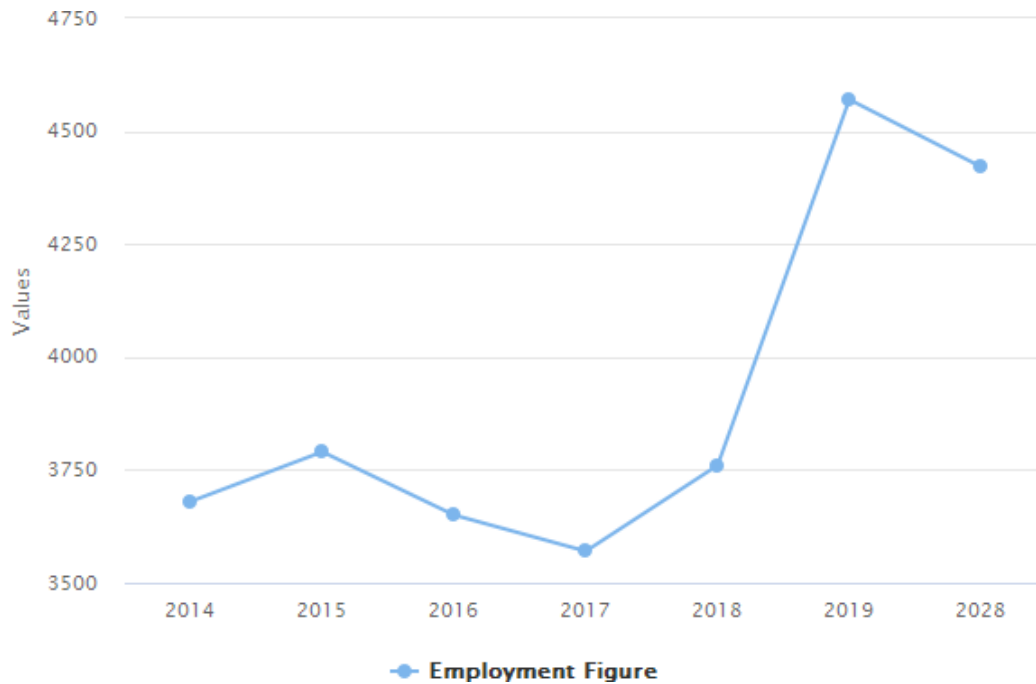
The number of jobs is expected to stay the same over the next 10 years.

GROWTH BY GEOGRAPHY

Geography	Selected Occupations	Total Labor Market	Relative Growth
Portland,	-1.79	7.53	Lo
Oregon	-3.26	7.97	Lo
Nationwide	3.62	4.24	Average

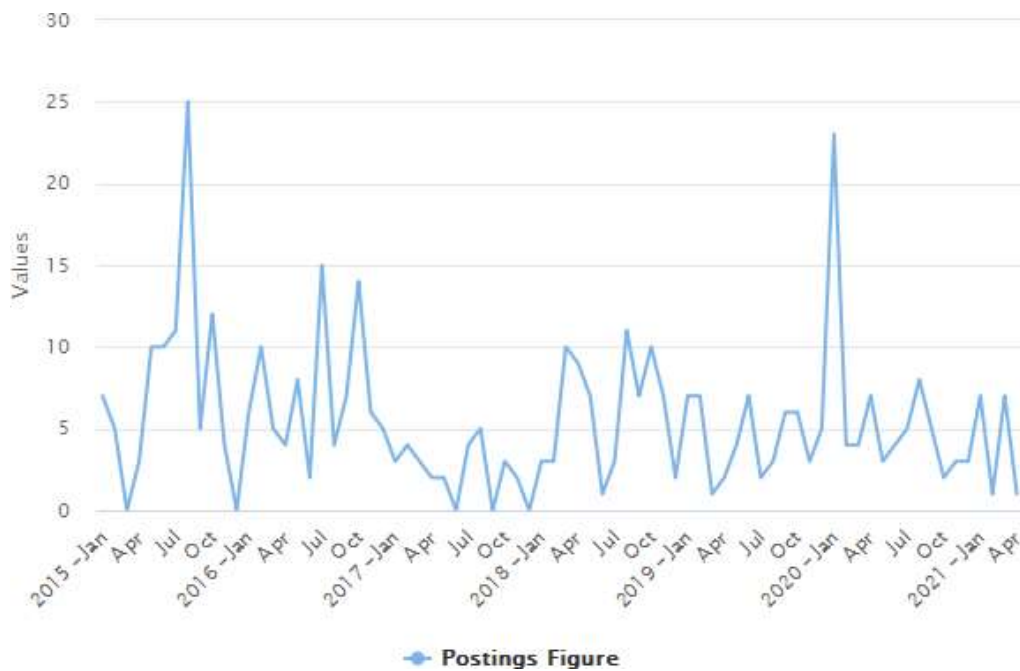
HOW HAS EMPLOYMENT CHANGED FOR CAREER OUTCOMES OF YOUR PROGRAM?

	2014	2015	2016	2017	2018	2019	2028
Employment (BLS)	3,680	3,790	3,650	3,570	3,760	4,570	4,421



Employment data between years 2019 and 2028 are projected figures.

POSTINGS TRENDS



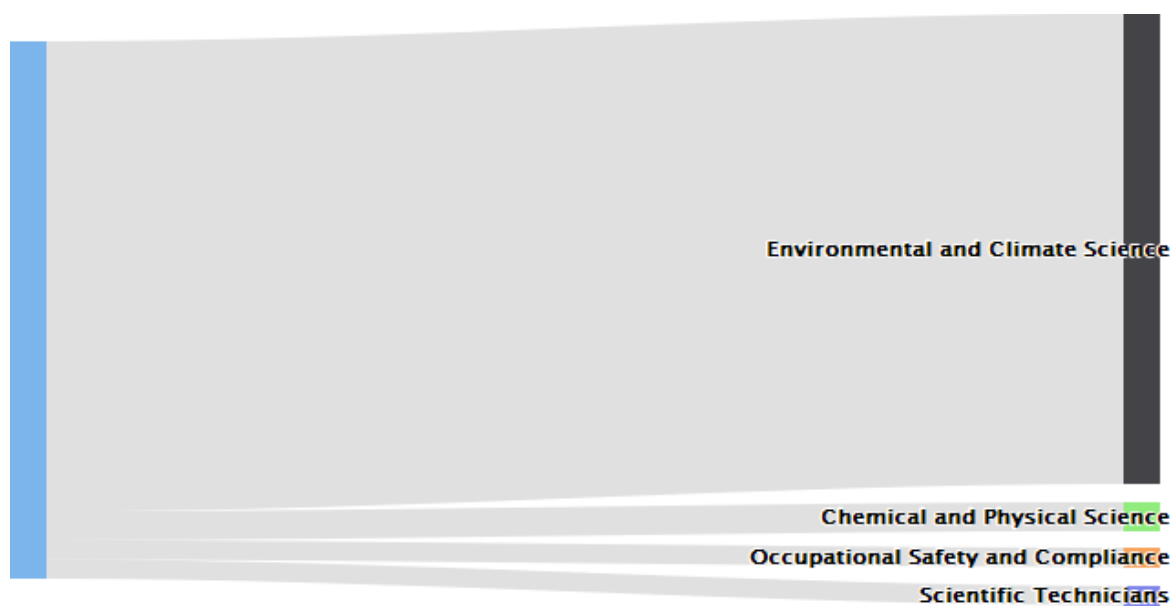
DETAILS BY OCCUPATION

Occupation Group	Postings	LQ	Employment (2019)	Employment Growth (2018 - 2019)	Projected Employment Growth (2019-2028)
Environmental and Climate Science	49	1.60	670	8.10%	8.20%
Chemical and Physical Science	3	0.40	620	1.60%	15.30%
Occupational Safety and Compliance	2	0.40	3,480	21.70%	-7.70%
Scientific Technicians	2	0.40	180	NA	0.00%

HOW VERSATILE IS THIS DEGREE FOR MY GRADUATES?

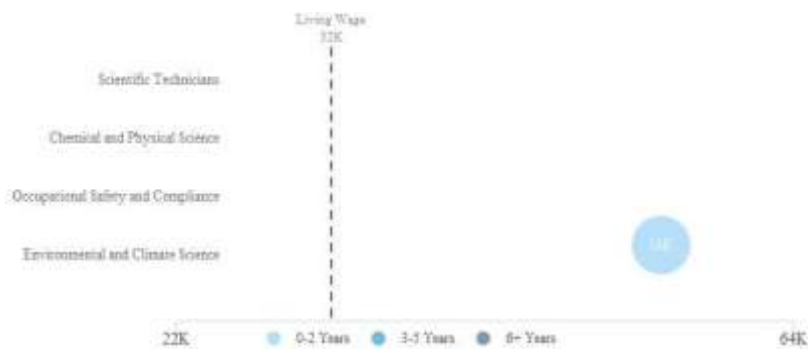
Graduates of this program usually transition into any of the 4 different occupation groups:

Occupations Group	Market Size (postings)	Percentage of Career Outcome demand
Environmental and Climate Science	49	87.50%
Chemical and Physical Science	3	5.36%
Occupational Safety and Compliance	2	3.57%
Scientific Technicians	2	3.57%



WHAT SALARY WILL MY GRADUATES FIND UPON GRADUATION?

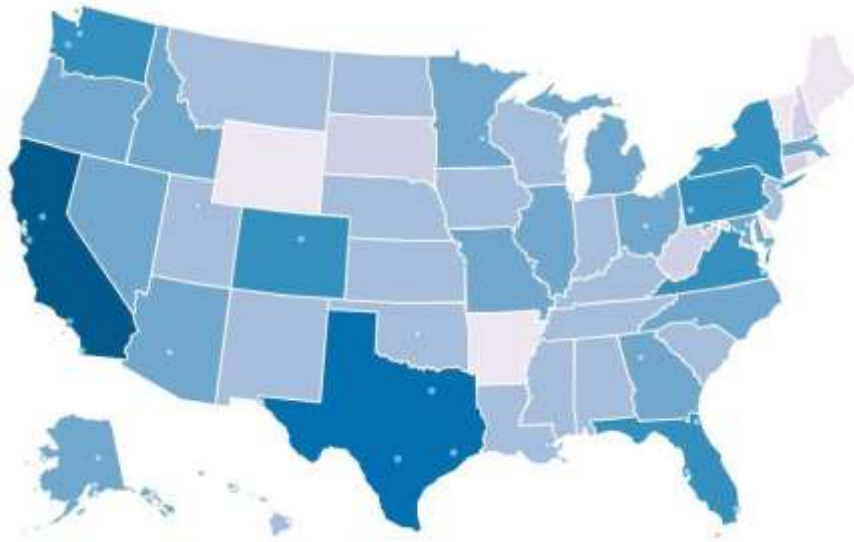
The median salary in **Oregon** for graduates of your program is **\$83K**. This average salary is **Above** the average living wage for Oregon of **\$32K**.



Salary numbers are based on Burning Glass models that consider advertised job posting salary, BLS data, and other proprietary and public sources of information.

Occupation Group	0-2 Years	3-5 Years	6+ Years
Scientific Technicians	NA	NA	NA
Chemical and Physical Science	NA	NA	NA
Occupational Safety and Compliance	NA	NA	NA
Environmental and Climate Science	\$54 K	NA	NA

WHERE IS DEMAND FOR MY PROGRAM?



TOP LOCATIONS BY POSTING DEMAND

Location	Postings
California	508
Texas	214
Pennsylvania	146
Colorado	132
Washington	131
Virginia	116
Florida	108
New York	103
Minnesota	94
Alaska	84

VALIDATE: COMPETITIVE LANDSCAPE

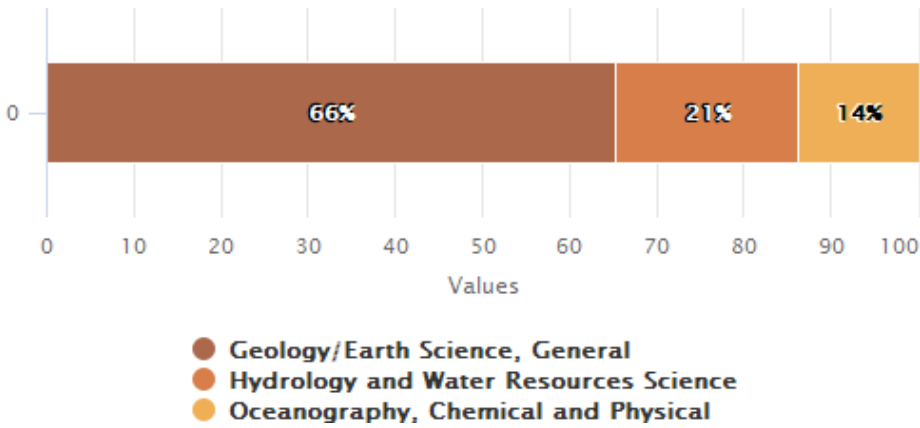
PROJECT CRITERIA

Validate	Programs
States	Oregon
Metro Areas (MSAs)	Portland-Vancouver-Hillsboro, OR-WA
Degree Level	Master's degree
Time Period	4/1/2020 - 3/31/2021
Selected Programs	Geochemistry (40.0602), Geochemistry and Petrology (40.0606), Geological and Earth Sciences/Geosciences, Other (40.0699), Geology/Earth Science, General (40.0601), Geophysics and Seismology (40.0603), Hydrology and Water Resources Science (40.0605), Oceanography, Chemical and Physical (40.0607), Paleontology (40.0604)
Career Outcomes mapped to Selected Programs of Study	Geophysicist, Geologist, Environmental Compliance Specialist, Physical / Geoscience Technician, Physical Scientist, Hydrologist

OVERVIEW

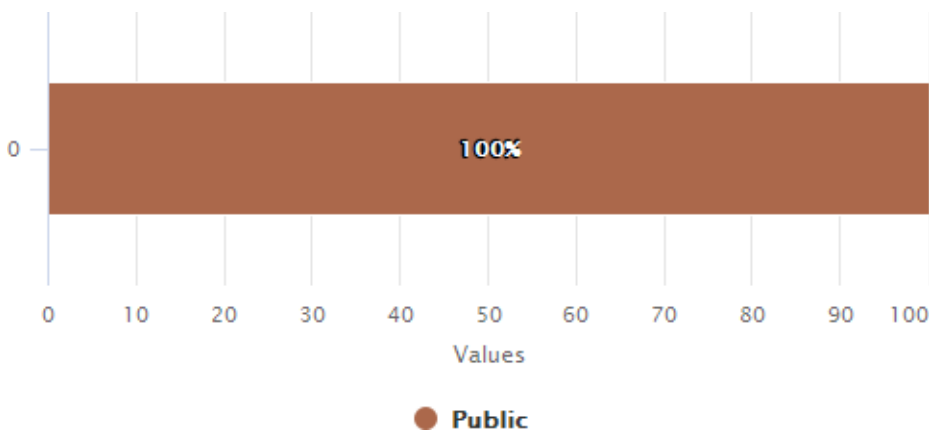
	#	% Change (2015- 2019)
Degrees Conferred	29	-3%
Number of Institutions	4	33%
Average Conferrals by Institution	7	- 30.00%
Median Conferrals by Institution	6	- 25.00%

MARKET SHARE BY PROGRAM



Program	Conferrals (2019)	Market Share (%)
Geology/Earth Science, General	19	65.52%
Hydrology and Water Resources Science	6	20.69%
Oceanography, Chemical and	4	13.79%
Geological and Earth Sciences/Geosciences, Other	0	0.00%
Geophysics and	0	0.00%

MARKET SHARE BY INSTITUTION TYPE



Institution Type	Conferrals (2019)	Market Share (%)
Public	29	100.00%

TOP INSTITUTIONS

Institution	School Type	Market Share (2019)	Market Share Change	Conferrals (2019)	Conferrals Change (2015-2019)
Oregon State University	Publi	58.62%	8.62%	17	13.30%
Portland State University	Publi	20.69%	-	6	-
University of Oregon		20.69%	-	6	-
Western Oregon University	Publi	0.00%	0.00%	0	0.00%

TOP PROGRAMS

Program	Market Share (2019)	Market Share Change	Conferrals (2019)	Conferrals Change (2015-2019)
Geology/Earth Science, General	65.52%	5.52%	19	5.60%
Hydrology and Water Resources Science	20.69%	7.36%	6	50.00%
Oceanography, Chemical and Physical	13.79%	-	4	-
Geological and Earth Sciences/Geosciences, Other	0.00%	0.00%	0	0.00%
Geophysics and Seismology	0.00%	-	-	-

ACTIVE COMPETITORS

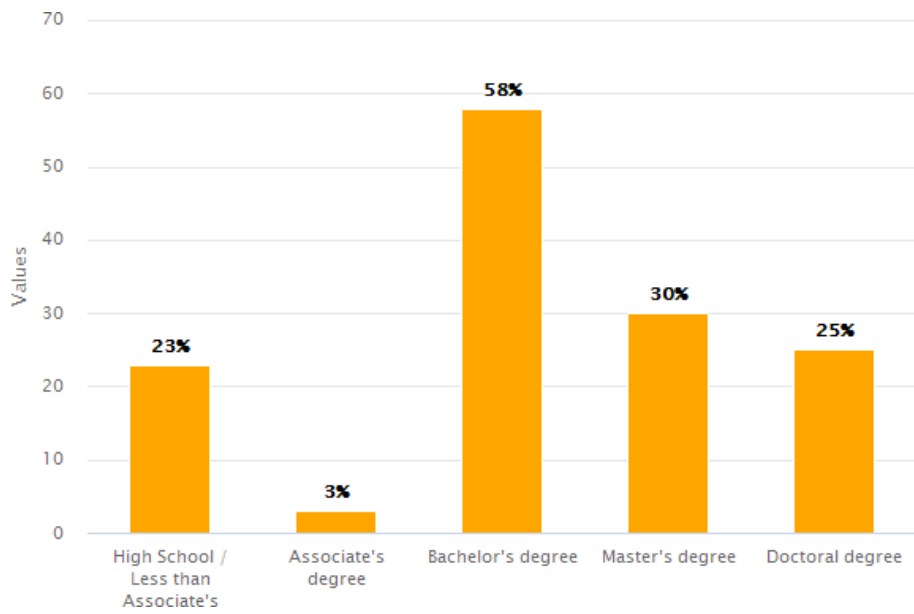
Institution	School Type	Market Share (2019)	Market Share Change	Conferrals (2019)	Conferrals Change (2015-2019)
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No data is currently available

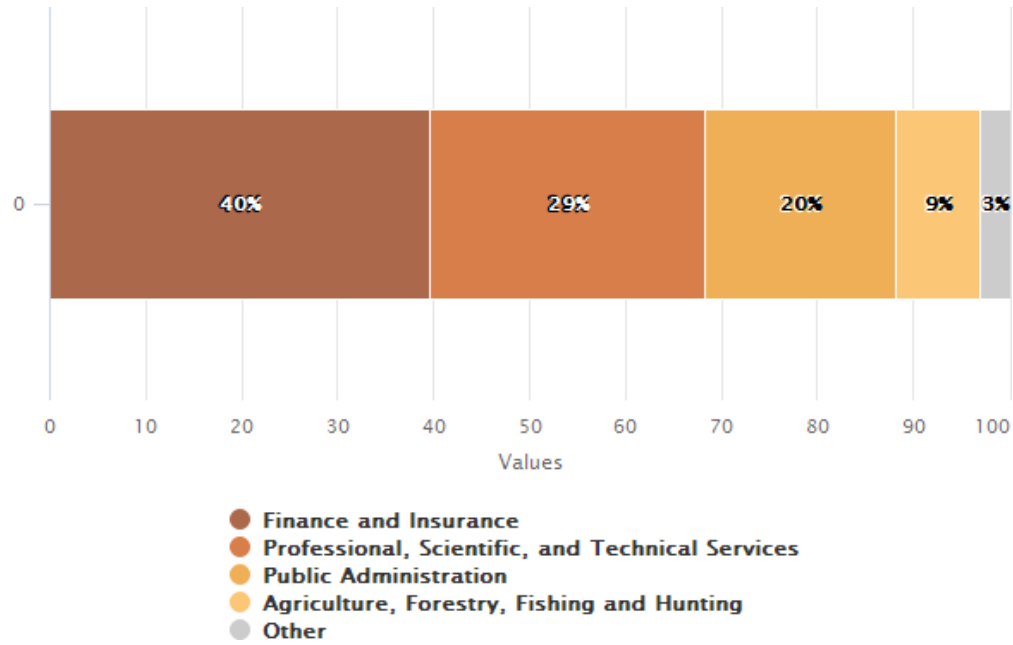
VALIDATE: MARKET ALIGNMENT

PROJECT CRITERIA	
Validate	Programs
States	Oregon
Metro Areas (MSAs)	Portland-Vancouver-Hillsboro, OR-WA
Degree Level	Master's degree
Time Period	4/1/2020 - 3/31/2021
Selected Programs	Geochemistry (40.0602), Geochemistry and Petrology (40.0606), Geological and Earth Sciences/Geosciences, Other (40.0699), Geology/Earth Science, General (40.0601), Geophysics and Seismology (40.0603), Hydrology and Water Resources Science (40.0605), Oceanography, Chemical and Physical (40.0607), Paleontology (40.0604)
Career Outcomes mapped to Selected Programs of Study	Geophysicist, Geologist, Environmental Compliance Specialist, Physical / Geoscience Technician, Physical Scientist, Hydrologist

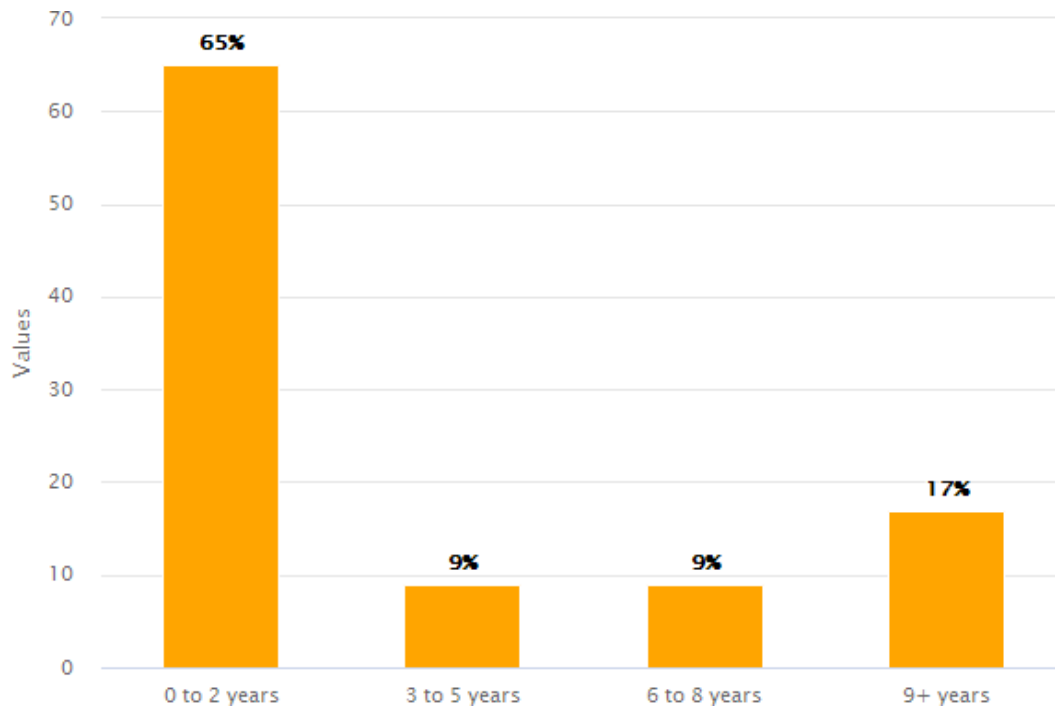
JOB POSTINGS BY ADVERTISED EDUCATION (%)



JOB POSTINGS BY INDUSTRY (%)



JOB POSTINGS BY EXPERIENCE REQUESTED (%)



TOP TITLES

Experience Level: All Experience

Title	Postings	Market Share (%)
Hydrologist/Watershed Modeler	12	33.33%
Hydrologist	6	16.67%
Geologist IV	3	8.33%
Hydrologist, Gs	2	5.56%
Physical Scientist	2	5.56%
Project Geologist	2	5.56%
Environmental Compliance Specialist	1	2.78%
Geochemist	1	2.78%
Geologist	1	2.78%
Geologist - , Or	1	2.78%
Geospatial Systems Specialist	1	2.78%
Mid-Level Geologist Or Hydrogeologist	1	2.78%
Mid-Level Hydrogeologist	1	2.78%
Senior Hydrogeologist	1	2.78%
Servicemember And Regulation O Regulatory Compliance Programs Lead	1	2.78%

TOP EMPLOYERS HIRING

Experience Level: All Experience

Employer	Postings	Market Share (%)
The Freshwater Trust	12	33.33%
AECOM Technology Corporation	3	8.33%
Forest Service	3	8.33%
Arcadis	2	5.56%
US Department of Agriculture	2	5.56%
Bureau of Land Management	1	2.78%
City Salem	1	2.78%
GSI Commerce	1	2.78%
Geodesign Incorporated	1	2.78%
Golder Associates	1	2.78%
Leidos	1	2.78%
National Oceanic and Atmospheric Administration	1	2.78%
Natural Resources Conservation	1	2.78%
Scs Engineers	1	2.78%
Terracon Consultants, Inc.	1	2.78%

VALIDATE: KEY COMPETENCIES

PROJECT CRITERIA

Validate	Programs
States	Oregon
Metro Areas (MSAs)	Portland-Vancouver-Hillsboro, OR-WA
Degree Level	Master's degree
Time Period	4/1/2020 - 3/31/2021
Selected Programs	Geochemistry (40.0602), Geochemistry and Petrology (40.0606), Geological and Earth Sciences/Geosciences, Other (40.0699), Geology/Earth Science, General (40.0601), Geophysics and Seismology (40.0603), Hydrology and Water Resources Science (40.0605), Oceanography, Chemical and Physical (40.0607), Paleontology (40.0604)
Career Outcomes mapped to Selected Programs of Study	Geophysicist, Geologist, Environmental Compliance Specialist, Physical / Geoscience Technician, Physical Scientist, Hydrologist

TOP 15 SPECIALIZED SKILLS

Skill	Postings	Projected Growth	Salary Premium	Competitive Advantage
Hydrology	28 (51.85%)	2.89%	No	No
Data Collection	22 (40.74%)	0.22%	No	No
Quality Assurance and Control	19 (35.19%)	39.46%	No	No
Land Management	18 (33.33%)	25.83%	No	No
Python	15 (27.78%)	61.12%	No	No
Technical Assistance	15 (27.78%)	-29.77%	No	No
Git	14 (25.93%)	59.81%	No	No
Hydrologic Modeling	14 (25.93%)	62.90%	Yes	No
Budgeting	13 (24.07%)	-10.04%	Yes	No
Data Visualization	12 (22.22%)	72.42%	Yes	No
GitHub	12 (22.22%)	79.37%	No	No
Machine Learning	12 (22.22%)	102.54%	No	No
Predictive Models	12 (22.22%)	2.17%	No	No
Resource Conservation	12 (22.22%)	15.99%	No	No
SQL	12 (22.22%)	-13.30%	No	No

TOP 15 BASELINES SKILLS

Skill	Postings
Communication Skills	30 (55.56%)
Research	24 (44.44%)
Creativity	16 (29.63%)
Self-Starter	13 (24.07%)
Writing	13 (24.07%)
Analytical Skills	12 (22.22%)
Critical Thinking	12 (22.22%)
Planning	12 (22.22%)
Detail-Oriented	9 (16.67%)
Preparing Reports	8 (14.81%)
Physical Abilities	7 (12.96%)
Organizational Skills	6 (11.11%)
English	6 (11.11%)
Oral Communication	5 (9.26%)
Multi-Tasking	5 (9.26%)

TOP 15 SOFTWARE PROGRAMMING SKILLS

Skill	Postings	Projected Growth	Salary Premium	Competitive Advantage
Python	15 (27.78%)	61.12%	No	No
Git	14 (25.93%)	59.81%	No	No
Data Visualization	12 (22.22%)	72.42%	Yes	No
GitHub	12 (22.22%)	79.37%	No	No
SQL	12 (22.22%)	-13.30%	No	No
Microsoft Office	4 (7.41%)	-10.20%	No	No
ArcGIS	2 (3.70%)	-0.43%	No	No
AutoCAD	2 (3.70%)	4.22%	No	No
Geographic Information System (GIS)	2 (3.70%)	-42.56%	No	No
Microsoft Powerpoint	1 (1.85%)	-8.52%	No	No
Microsoft Word	1 (1.85%)	-13.39%	No	No
Active Server Pages (ASP)	1 (1.85%)	-52.12%	No	No
Microsoft Excel	1 (1.85%)	17.03%	No	No

TOP 15 SKILL CLUSTERS

Skill	Postings
Earth and Space Science	39 (72.22%)
Environmental Geology	25 (46.30%)
Data Techniques	23 (42.59%)
Conservation	23 (42.59%)
Resource Management and Restoration	23 (42.59%)
Scripting Languages	15 (27.78%)
Data Visualization	13 (24.07%)
Environmental Work	13 (24.07%)
Budget Management	13 (24.07%)
SQL Databases and Programming	12 (22.22%)
Water Testing and Treatment	11 (20.37%)
People Management	11 (20.37%)
Geotechnical Engineering	10 (18.52%)
Chemistry	9 (16.67%)
Physics	9 (16.67%)

TOP 15 SALARY PREMIUM SKILLS

Skill	Postings	Projected Growth	Salary Premium	Competitive Advantage
Hydrologic Modeling	14 (25.93%)	62.90%	Yes	No
Budgeting	13 (24.07%)	-10.04%	Yes	No
Data Visualization	12 (22.22%)	72.42%	Yes	No
Geology	12 (22.22%)	-51.05%	Yes	No
Water Conservation	10 (18.52%)	-21.54%	Yes	No
Physics	9 (16.67%)	-16.38%	Yes	No
Hydrologic Analysis	8 (14.81%)	11.53%	Yes	No
Data Analysis	7 (12.96%)	81.86%	Yes	Yes
Project Management	6 (11.11%)	-19.74%	Yes	Yes
Civil Engineering	6 (11.11%)	7.71%	Yes	Yes
Business Development	2 (3.70%)	-8.98%	Yes	No
Occupational Health and Safety	2 (3.70%)	19.02%	Yes	No
Natural Resources	2 (3.70%)	-38.40%	Yes	No
Statistical Analysis	2 (3.70%)	-17.77%	Yes	No
Statistics	2 (3.70%)	2.65%	Yes	No

TOP 15 COMPETITIVE ADVANTAGE SKILLS

Skill	Postings	Projected Growth	Salary Premium	Competitive Advantage
Data Analysis	7 (12.96%)	81.86%	Yes	Yes
Site Investigations	6 (11.11%)	-65.63%	No	Yes
Project Management	6 (11.11%)	-19.74%	Yes	Yes
Civil Engineering	6 (11.11%)	7.71%	Yes	Yes
Groundwater Flow Analysis	1 (1.85%)		Yes	Yes

Skills	Postings	Salary Premium	Competitive Advantage
Driver's License	7 (12.96%)	No	No
Project Management Certification	1 (1.85%)	No	No
Cdl Class C	1 (1.85%)	No	No
Certification in Risk Management Assurance (CRMA)	1 (1.85%)	No	No
Certified Regulatory Compliance Manager (CRCM)	1 (1.85%)	No	No
Vocational Rehabilitation License	1 (1.85%)	No	No
Hazwoper	1 (1.85%)	No	No
Real Estate Certification	1 (1.85%)	No	No

Institution: Portland State University
Program: PSM in Applied Geoscience

Action: At the **June 1, 2022** meeting, the Statewide Provosts Council approved a new program for **Portland State University, PSM in Applied Geoscience** to move forward to the Oregon Higher Education Coordinating Commission for its review and approval. The **Portland State University** Board of Trustees approved the **PSM in Applied Geoscience** program at its **April 5, 2022** meeting.

Eastern Oregon University

Sarah Witte, provost

Approved

Opposed

Abstained



Oregon Health & Science University

David Robinson, interim provost

Approved

Opposed

Abstained



Oregon State University

Ed Feser, provost

Approved

Opposed

Abstained



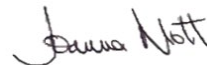
Oregon Tech

Joanna Mott, provost

Approved

Opposed

Abstained



Portland State University

Susan Jeffords, provost

Approved

Opposed

Abstained



Southern Oregon University

Susan Walsh, provost

Approved

Opposed

Abstained



University of Oregon

Patrick Phillips, provost

Approved

Opposed

Abstained



Western Oregon University

Rob Winningham, provost

Approved

Opposed

Abstained

