Docket Item:

University Program Approval: Oregon State University, Bachelor of Science (B.S.) in Geology.

Summary:

Oregon State University proposes a new degree program leading to a B.S. in Geology. 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:

B.S. in Geology at Oregon State University.
Proposal for a New Academic Program

Institution: Oregon State University
College/School: College of Earth, Ocean, and Atmospheric Sciences
Department/Program Name: N/A
Degree and Program Title: BS in Geology

1. Program Description
   a. Proposed Classification of Instructional Programs (CIP) number.

   40.0601 Definition: A program that focuses on the scientific study of the earth; the forces acting upon it; and the behavior of the solids, liquids and gases comprising it. Includes instruction in historical geology, geomorphology, and sedimentology, the chemistry of rocks and solids, stratigraphy, mineralogy, petrology, geostatistics, volcanology, glaciology, geophysical principles, applications to research, and industrial problems.

   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.

   We propose a new Bachelor of Science degree in Geology to replace the existing Geology option within the BS in Earth Sciences housed in the College of Earth, Ocean, and Atmospheric Sciences (CEOAS).

   The BS in Geology will prepare students to understand the earth, from its composition and internal structure to its history and the processes that shape its surface. Based on existing strengths in CEOAS in the areas of earth materials, surficial process, earth dynamics and field techniques, the program will involve a broad, high-quality curriculum that will prepare students for careers in applied geology, environmental sciences, science education, and research.

   Geologists contribute to society through the discovery of earth resources, recognition and mitigation of natural disasters, and environmental remediation of human impacts. In CEOAS, experiential learning lies at the core of a geologist’s education and practical field experiences are integrated throughout the curriculum. The program will take advantage of OSU’s world-class faculty for undergraduate teaching and advising and will attract motivated students to a signature program that trains future geoscience leaders.

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

   Geology Major

   Basic Mathematics and Science:
   MTH 251 Differential Calculus – 4 cr.
   MTH 252 Integral Calculus – 4 cr.
   CH 231 & CH 261 General Chemistry and Lab or CH 121 General Chemistry (lab inc.) – 5 cr.
   CH 232 & CH 262 General Chemistry and Lab or CH 122 General Chemistry (lab inc.) – 5 cr.
   PH 211 General Physics with Calculus or PH 201 General Physics – 4-5 cr.
   PH 212 General Physics with Calculus or PH 202 General Physics – 4-5 cr.
ST 351 Introduction to Statistical Methods – 4 cr.
Total: 30-32 credits

Additional Chemistry or Physics (select one of the following):
CH 123 General Chemistry (lab inc.) – 5 cr.
CH 233 & CH 263 General Chemistry and lab – 5 cr.
PH 203 General Physics – 5 cr.
PH 213 General Physics with Calculus – 4 cr.
Total: 4-5 credits

Geology Foundation Courses:
GEO 201 Physical Geology – 4 cr.
GEO 202 Earth Systems Science – 4 cr.
GEO 203 Evolution of Plane Earth – 4 cr.
GEOG 360 GIScience I: Geographic Information Systems and Theory – 4 cr.
Total: 16 credits

Geology Core Courses:
GEO 295 Introduction to Field Geology – 3 cr.
GEO 301 Geosciences Data Analysis – 4 cr.
GEO 310 Earth Materials I: Mineralogy – 4 cr.
GEO 315 Earth Materials II: Petrology – 4 cr.
GEO 322: Surface Processes – 4 cr.
GEO 340 Structural Geology – 4 cr.
GEO 370 Stratigraphy and Sedimentology – 4 cr.
GEO 415 Earth Materials III: Petrology – 4 cr.
GEO 430 Geochemistry – 4 cr.
GEO 463 Geophysics and Tectonics – 4 cr.
GEO 487 Hydrogeology – 4 cr.
GEO 495 Advanced Field Geology – 6 cr.
Total: 49 credits

Geology Elective Specialization (select four courses from the following categories): 12-16 cr.

Solid Earth:
GEO 412 Igneous Petrology
GEO 440 Economic Geology
GEO 497 Field Mapping of Ore Deposits

Natural Hazards:
GEO 427 Volcanology
GEO 433 Coastal Geomorphology
GEO 461 Geology of Earthquakes

Earth Surface:
BI 427 Paleobiology
GEO 431 Environmental Geochemistry
GEO 432 Applied Geomorphology
GEO 477 Glaciers in the Climate System
GEO 481 Glacial Geology
GEO 484 Introduction to BioGeoChemistry
GEO 486 Quaternary Paleoclimatology
GEO 488 Quaternary Stratigraphy of North American
GEOG 423 Snow Hydrology
GEOG 480 Remote Sensing I: Principles and Applications
OC 460 Geological Oceanography

Credits from the following courses may count toward an elective specialization with approval from Program Head:
400 level courses in other departments or programs
GEO 403 Thesis
500 level courses in GEO or GPH courses

Additional Baccalaureate Core Courses: 33-40
General Electives 22-36
Total Credits Needed: 180 credits
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).**

The program will be delivered face-to-face on the Corvallis campus.

e. **Adequacy and quality of faculty delivering the program.**

Geology faculty represent an established undergraduate teaching unit. They have been successful in delivering Geology courses with consistently high teaching evaluations and a significant proportion of teaching awards on campus. Geology faculty are noted for their research productivity and participation in outreach and engagements with recognition at national and international levels.

f. **Adequacy of faculty resources – full-time, part-time, adjunct.**

Geology faculty include 31 tenure track and 9 research faculty or fixed term instructors.

g. **Other staff.**

The program will be supported by three staff members from the Office of Student Services, 5 staff members from the Publication Office, 4 staff members from undergraduate advising, and 4 staff members from computing support.

h. **Adequacy of facilities, library, and other resources.**

Library resources are excellent, and classroom and facilities are currently adequate to meet the needs for course delivery.

i. **Anticipated start date.**

Fall 2021

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.**

   Oregon State University is a land grant institution committed to teaching, research, outreach, and engagement. Geologists apply knowledge of chemistry, physics, and mathematics to solve problems related to earth systems and their impact on human life. A comprehensive program of this nature will provide students with the solid background to contribute to any of OSU's three signature areas of focus as identified in OSU's mission statement.

   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 Geology program will be committed to enhancing student access and diversity. The College of Earth, Ocean, and Atmospheric Sciences has a long history of promoting diversity, access, and inclusion through its successful efforts to engage students from all backgrounds in majors within the college. The college has sought and received funding to increase diversity and access through recruitment and retention efforts.

   The College’s faculty and staff participate in conversations and activities to strengthen and support diversity within the College. A Professional Learning Community explores
topics related to social justice, diversity, and inclusivity. Recently, the College hosted a Social Justice Initiative Session in which the topic was “Creating Equitable Teaching and Learning Environments”.

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

   The BS in Geology will contribute to the improved educational attainment in Oregon and the Pacific Northwest. The study of geology offers an opportunity to understand earth materials, the processes shaping those materials, and human’s place on the earth. Geology graduates will be adept at placing those skills into a broader perspective and understand the broader connections and the scientific process.

   ii. respond effectively to social, economic, and environmental challenges and opportunities; and

   Geology plays a crucial role in Oregon’s social, economic, and environmental systems. Graduates of the program will be prepared to address these challenges and pursue opportunities for solutions. The program will have positive economic and environmental impacts on the Pacific Northwest which resides in an active and geological diverse zone.

   iii. address civic and cultural demands of citizenship.

   The BS in Geology degree prepares students for civic and cultural responsibilities on several levels. The knowledge and training gained through the geology program allows students to understand geological issues on local, state, national, and global levels. Students are trained to assess geological issues and respond to those issues; that knowledge creates informed voters and graduates prepared for the demands and responsibilities of citizenship.

3. Accreditation

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

      N/A

   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.

      N/A

   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.

      N/A
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.

N/A

4. Need

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

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

We expect to graduate approximately 100 students over the next five years.

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

The B.S. Geology will service both full-time and part-time students with a diverse mix of traditional and non-traditional students.

d. Evidence of market demand.

According to the U.S. Bureau of Labor Statistics, employment for geoscientists is projected to grow 6% in the next ten years which is as fast as the average for all occupations in the U.S. Based on workforce surveys conducted in 2019 by the American Institute of Professional Geologists, geologists are employed in three broad sectors: environmental remediation and management; natural resources discovery and utilization; and engineering and construction. The need for employment in these three broad sectors is projected to spur the demand for more geoscientists.

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).

N/A

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?

Graduates will be prepared for careers in applied geology, environmental sciences, science education, and research.

5. Outcomes and Quality Assessment

a. Expected learning outcomes of the program.

1. Demonstrate knowledge of the fundamental concepts of geology including origin, composition, and evolution of the earth and its components, and how the earth system responds to internal and external forces over geologic time.

2. Analyze, interpret, and model geologic data using a variety of critical thinking skills and techniques to test hypothesis.
3. Utilize applied practical skills in geology in the laboratory, field, and internships or directed research at a basic and advanced level through intensive experiential learning.

4. Demonstrate quantitative literacy in techniques specific to geology.

5. Communicate scientific observations and interpretations verbally, in writing, and through graphical presentations to researchers and the general public.

**b. Methods by which the learning outcomes will be assessed and used to improve curriculum and instruction.**

Learning outcomes will be assessed at the program level each year in order to improve and adjust the curriculum as needed. Specific courses in the curriculum are tied to each learning outcome to provide the specific data needed to make curriculum and instruction decisions and updates.

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

The College of Earth, Ocean, and Atmospheric Science sets expectations for the nature and level of research and/or scholarly activity of program faculty. The appropriate administrator evaluates all tenure and tenure-track faculty on an annual basis to ensure that they are meeting expectations for scholarly work.

**6. Program Integration and Collaboration**

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

Portland State University, University of Oregon, and Western Oregon University, all have geology programs. The OSU program will compliment them as the Geology option within the Earth Sciences program historically has. The Geology option has existed at OSU for decades, and we do not anticipate that elevating it to a degree will create any new competition for students since we already enroll many students interested in the option. By creating a full degree program, we afford those students a credential that will position them for careers and graduate study.

**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.**

The College and its faculty are always open for collaboration with faculty at other Oregon institutions in a manner that will benefit each institution.

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

N/A

**d. Potential impacts on other programs.**

The program does not anticipate any impact on other programs.

**7. External Review – N/A (This is an undergraduate program.)**

If the proposed program is a graduate level program, follow the guidelines provided in *External Review of New Graduate Level Academic Programs* in addition to completing all of the above information.
Summary of Prospective Program in Development

BS in Geology (OSU Corvallis)

Submitted to Statewide Provosts Council: 20 October 2020

**Description**

We propose a new Bachelor of Science degree in Geology to replace the existing Geology option within the BS in Earth Sciences housed in the College of Earth, Ocean, and Atmospheric Sciences (CEOAS). The current Geology option is quite popular, with roughly 100 students enrolled, and we anticipate that many of the students currently choosing the option would enthusiastically choose the full bachelor’s degree.

The BS in Geology will prepare students to understand the earth, from its composition and internal structure to its history and the processes that shape its surface. Based on existing strengths in CEOAS in the areas of earth materials, surficial process, earth dynamics and field techniques, the program will involve a broad, high-quality curriculum that will prepare students for careers in applied geology, environmental sciences, science education, and research.

Geologists contribute to society through the discovery of earth resources, recognition and mitigation of natural disasters, and environmental remediation of human impacts. In CEOAS, experiential learning lies at the core of a geologist’s education and practical field experiences are integrated throughout the curriculum. The program will take advantage of OSU’s world-class faculty for undergraduate teaching and advising and will attract motivated students to a signature program that trains future geoscience leaders.

**Program Location and Modality**

This will be a face-to-face program located at OSU in Corvallis.

**Anticipated Start Date**

Summer 2021

**Anticipated Enrollment**

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These projected enrollment numbers reflect current OSU student enrollment in the geology option plus the expected increase among current OSU students due to the higher visibility of the geology major. The program will create a freshman seminar that will expose students to research areas and fields of study within geology as well as introduce them to faculty, factors which should fuel student interest.

**Addressing Statewide Needs & Alignment with OSU**

The BS in Geology directly addresses goal 2 of OSU’s Strategic Plan 4.0 to provide a transformative education that is accessible to all learners. At the same time, the Geology program is a core contribution to one of OSU’s three signature areas, revolutionary earth systems science. Geology graduates will be prepared to address a wide range of issues associated with natural resources, surficial processes, and natural hazards associated with our changing planet and the needs of the people living on it.

Our highly skilled, nationally, and internationally recognized faculty will provide a distinctive curriculum and incorporate innovative pedagogy for the BS in Geology. We will include active learning throughout the curriculum, and students will have immersive experiential learning opportunities in courses, research projects, theses, or internships.

**Summary**

Portland State University, University of Oregon, and Western Oregon University, all have geology programs. The OSU program will compliment them as the Geology option within the Earth Sciences program historically has. The Geology option has existed at OSU for decades, and we do not anticipate that elevating it to a degree will create any new competition for students since we already enroll many students interested in the option. By creating a full degree program, we afford those students a credential that will position them for careers and graduate study.

**Contacts**

New programs at OSU are developed in partnership with OSU college faculty and staff and OSU’s Office of Academic Programs and Assessment. Interested universities should reach out to the following contacts (please include all in communications about this new program):

1. Janice Nave-Abele; Curriculum Coordinator, Academic Programs and Assessment  
   Janice.Nave-Abele@oregonstate.edu

2. Frank Tepley; Professor, College of Earth, Ocean, and Atmospheric Sciences  
   Frank.Tepley@oregonstate.edu
Institution: Oregon State University
Program: BS in Geology

Action: At the June 15, 2021, meeting, the Statewide Provosts Council approved a new program for Oregon State University, BS in Geology to move forward to the Oregon Higher Education Coordinating Commission for its review and approval. The Oregon State University Board of Trustees approved the BS in Geology program at its May 19, 2021, meeting.

Eastern Oregon University
Sarah Witte, provost
X Approved
__Opposed
__Abstained

Oregon Health & Science University
Elena Andresen, interim provost
X Approved
__Opposed
__Abstained

Oregon State University
Ed Feser, provost
X Approved
__Opposed
__Abstained

Oregon Tech
Joanna Mott, provost
X Approved
__Opposed
__Abstained

Portland State University
Susan Jeffords, provost
X Approved
__Opposed
__Abstained

Southern Oregon University
Susan Walsh, provost
X Approved
__Opposed
__Abstained

University of Oregon
Patrick Phillips, provost
X Approved
__Opposed
__Abstained

Western Oregon University
Rob Winningham, provost
X Approved
__Opposed
__Abstained