

UNIVERSITY OF MARY WASHINGTON – PROGRAM CHANGE PROPOSAL

Electronically submit this completed form with attachments [in one file](#) to the Chair of the College Curriculum Committee.

COLLEGE (check one):	Arts and Sciences <input checked="" type="checkbox"/>	Business <input type="checkbox"/>	Education <input type="checkbox"/>
Proposal Submitted By: Jodie Hayob	Date Prepared: 10-18-16		
Department /Program:	Earth and Environmental Sciences		

Note: for any program change entailing the addition any new courses, or revisions to existing courses, separate proposal for those course actions must also be submitted.

PROPOSAL TO CHANGE EXISTING PROGRAM (check no than one of the following)	
Revise requirements for existing major	X
Revise requirements for a concentration within an existing major	
Revise requirements for an existing degree program	
Revise requirements for existing certificate program	
Revise requirements for existing minor	
Implementation Date: FALL semester, year:	2017

REQUIRED ATTACHMENTS FOR CHANGES TO EXISTING PROGRAMS:

1. **Rationale statement** (Why is this program change needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, technology, and impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of the program change are required.)
3. **Catalog Copy** (Provide the *existing* Catalog Description **and** the complete statement of the *proposed* new Catalog description that reflects the program changes)

PROPOSAL TO CREATE NEW PROGRAM NOT REQUIRING STATE ACTION	
(check no more that one of the following)	
New concentration within existing major	Name: _____
New minor	Name: _____
New Major but NOT a new degree*	Name: _____
<small>*Use ONLY for interdisciplinary majors that will be grouped as part of the "Special Majors/General Liberal Arts and Sciences" degree (CIP Code 24.0101) or reported as a BLS degree (CIP Code 24.0199)</small>	
Implementation Date (semester and year):	_____

REQUIRED ATTACHMENTS FOR NEW PROGRAMS NOT REQUIRING STATE APPROVAL:

1. **Rationale statement** (Why is this additional program needed? What purposes will it serve?)
2. **Impact Statement** (Provide details about the Library, space, budget, technology, staffing and curricular impacts created by this program change. Supporting statements from the Library, IT Department, etc. evaluating the resource impact and feasibility of adding the new program are required.)
3. **Catalog Copy** (Provide the complete Catalog Description for the proposed new program)
4. **Any change that impacts another Department must have a written statement (such as a copy of an email) from the Chair(s) agreeing to the change.**

Department Chair Approval: _____ Jodie Hayob _____ Date: 10-18-16

CCC Chair Approval: _____ Surupa Gupta _____ Date: 11/21/16

Dean Approval: _____ Richard Finkelstein _____ Date: 11/22/16

UCC Chair Approval: _____ Date: _____

*Provost Approval: _____ Date: _____

*Required only in cases of proposals for new concentrations, new minors, or new majors that do not involve a new degree

RE: GEOLOGY major – program changes

Proposal: the Department of Earth and Environmental Sciences is proposing, in separate expedited or major program change proposals, the following:

- to replace the “GEOL” course prefix for all former GEOL courses with “EESC” (expedited)
- changes to titles, descriptions, and/or prerequisites for a variety of courses (expedited)
- for EESC 205 – a change in title (expedited); the addition of a laboratory component and conversion from 3- to 4-credits (program change)
- for EESC 499 – to allow a maximum of 3 elective credits in the environmental science and geology major programs (program change)

All of the proposals noted above should be evaluated before considering *this* proposal. Changes to the Catalog text, shown below, are included for all of the modifications noted above (changes are shown in **bold red type**).

This proposal outlines changes in program requirements for the Geology major, which are:

- the inclusion of GEOG 250 or GISC 200 as alternate courses for our own GIS class (EESC 205)
- acceptance of EESC 210 – *Oceanography* in the Geology major without requiring the laboratory course (EESC 211) to be a pre- or co-requisite
- the addition of the EESC 481 *Readings* course as an elective in the Geology major

The new Catalog text below assumes that all changes described above (bullet points) have been approved (all changes are shown in **bold red type**). Note: the code change from GEOL to EESC now permits the EESC 307 course to be listed under the Geology major heading; this course was always an approved elective in the major.

Rationale

The EESC 205, GEOG 250, and GISC 200 courses are all accepted as having similar introductory GIS content and are approved as entry-level courses for the GIS certificate. Further, the Department accepts GEOG 250 and GISC 200 as substitutes for EESC 205 in our Environmental Science (both tracks) and Environmental Geology majors; it makes sense to accept them in the Geology major as well.

The content in the Oceanography 210 class is not covered in any of our other lower- or upper-level courses, and in light of accelerated recent climate change is especially important. Therefore, the Department believes that Geology majors will benefit by taking Oceanography even if they do not co-enroll in the laboratory class (EESC 211). (The EESC 211 lab class will continue to have EESC 210 as a pre- or co-requisite, but students would be able to take only the lecture portion, EESC 210, for elective credit in the major.)

Currently, a 481 Readings class is available only to Environmental Science students but the Department would like to make this course available to Geology majors as well; a readings independent study is one path for our students to satisfy their Experiential Learning General Education requirement and all of our major students may benefit from a readings/discussion experience.

Impact: The proposed changes to the Geology major will have no impact on other majors, minors, or concentrations. No additional resources or facilities are necessary to implement these changes.

Existing Catalog Description:

The Geology Program

Geology is the scientific study of the Earth, including its composition, dynamics, surface processes, and history. Our Geology major provides broad training in a diverse range of courses appropriate for students interested in pursuing a professional career or graduate studies in the earth sciences and related fields. The program also provides part of the necessary background for teaching the earth sciences. Because geology is an interdisciplinary science, students are encouraged to add courses from other fields. For example, students interested in paleontology are advised to take appropriate biology classes, whereas courses in chemistry and physics are important in disciplines such as seismology, geochemistry, hydrology, and studies of energy and mineral resources.

The Environmental Geology major is designed for students with a specific interest in Earth's surficial processes, especially as they relate to human interaction with the landscape and environment. Environmental geology, therefore, examines topics such as hydrogeology, soil and water chemistry, and geomorphology that lie at the interfaces of the lithosphere, the hydrosphere, and climate system. Students majoring in geology or environmental geology are encouraged to do independent study and research during their senior year. Financial support for student research is available. Qualified students may also choose to do an internship with a professional agency during either their junior or senior year. Students with a 3.00 overall grade-point average and a 3.25 average in geology courses may pursue Honors in Geology or Environmental Geology by completing an independent research project and writing and defending a thesis.

The Department has modern laboratories in the Jepson Science Center equipped with advanced analytical instruments to support classroom instruction and to provide opportunities for research. Major equipment includes petrographic microscopes an x-ray diffractometer, a magnetic susceptibility instrument, and lab facilities for paleontology, sedimentology and geochemistry. The Jepson Science Center has a variable pressure scanning electron microscope with chemical capabilities that is shared by the science disciplines. For geological fieldwork, the department has GPS equipment, research boats, coring and surveying equipment, and for classroom study, an extensive collection of rocks, minerals, and fossils. The department also maintains a computer lab/classroom equipped with the latest Geographic Information Systems (GIS) software.

Majors are encouraged to fulfill the general education experiential learning requirement by completing URES 197, GEOL 491, GEOL 493, or GEOL 499. Alternatively, majors may meet this requirement by participating in an approved supervised on-campus or off-campus summer research experience developed in consultation with department (such as the UMW Summer Science Research Program or a similar program at another college or university). To complete the experiential learning requirement through a summer research experience, contact the department chair for more details..

Requirements for Geology Major

Forty (40) credits, to include Geology 111, 112, 240, 301, 302, 311, and 412; and an additional twelve (12) credits in other geology courses including Geology 201, 205, 210 and 211 (must be taken concurrently and count as one elective) or other geology courses at the 300- level and above. Chemistry 331 or 332 may be substituted for up to four (4) of these credits. Environmental Science 307 and 493 may also be included for geology elective credit.

Requirements for Environmental Geology Major

Forty-one to forty-four (41-44) credits to include Chemistry 111 and 112, Geology 111, 112, 240, 301, 311, and 315, and either Geology 205 or Geography 250 or Geographic Information Science 200. In addition, choose two elective courses from the following: Geology 210 and 211 (210 and 211 must be taken concurrently and will count as one elective), 313, 325, 340, 360, 412, 493; Environmental Science 307, 326, 330, 493.

Geology Course Offerings (GEOL)

111 – Introductory Geology (4)

Introduction to the Earth: topics include mineral and rock composition of the crust and mantle, plate tectonics, earthquakes and volcanoes. Laboratory. Entry-level course.

112 – Evolution of the Earth (4)

Prerequisite: GEOL 111 or EESC 110. History of the Earth with emphasis on surficial processes, evolution of life, the hydrologic cycle and climate change. Laboratory.

201 – Paleontology (4)

Prerequisite: GEOL 111 or BIOL 121. This course introduces the fundamental procedures and applications of paleontology that include taxonomy, taphonomy, biostratigraphy, paleoecology and environmental science. The course format is project oriented with student opportunities to collect, describe and analyze fossil specimens retrieved from rock samples and sediment cores. The lab will provide a survey of the major fossil groups and introduce modern analytical procedures. Laboratory.

205 – Computer Applications in Environmental Science and Geology (3)

This course emphasizes the acquisition of spatial data and their display and analysis within ArcGIS geographic information system software. The class also includes an introduction to the use of global positioning system instruments for data collection. Cross-listed as EESC 205.

210 – Oceanography (3)

Prerequisite: GEOL 111. An introduction to the oceans. Physical and chemical processes affecting seawater; the geology of the seafloor; biological productivity in the oceans; and environmental challenges involving the oceans. Cross-listed as EESC 210.

211 – Oceanography Laboratory (1)

Corequisite: GEOL/EESC 210. Laboratory investigation of the chemical and physical properties of seawater; the tides; bathymetric measurements; coastal navigation; and marine biological processes. One or more field trips may be scheduled. Cross-listed as EESC 211.

221 – Environmental Geology (3)

Prerequisite: GEOL 111. Interaction of geologic phenomena and processes with society and the biosphere.

240 – Field Methods in Environmental Science and Geology (4)

Prerequisites: GEOL 111 or EESC 110 or GEOG 110. The Earth & Environmental Sciences rely heavily on mapping and collection of physical, chemical, and biological field data. Students enrolled in the course will complete weekly laboratory and hands-on exercises to learn the essential field skills necessary to advance their careers in the earth sciences as technicians, academics, and/or educators. This introductory field course will provide a solid foundation to

prepare students for advanced earth science study and/or a general introduction to the field methods within the discipline. Cross-listed as EESC 240.

301 – Mineralogy (4)

Prerequisite: GEOL 111; prerequisite or co-requisite CHEM 111. Study of Earth's major rock forming minerals, and those of economic value, in hand sample, microscopic thin section and through field studies. Course is conducted as a mix of lecture and laboratory activities. Laboratory.

302 – Petrology (4)

Prerequisite: GEOL 301; prerequisite or Corequisite CHEM 112. Study of metamorphic and igneous processes and important rock types in hand sample, microscopic thin-section and through field studies. Course is conducted as a mix of lecture and laboratory activities. Laboratory.

311 – Sedimentation and Stratigraphy (4)

Prerequisite: GEOL 111; prerequisite or Corequisite CHEM 111; recommended: GEOL 301. This course provides an overview of the concepts associated with sedimentary rock formation, including theoretical sedimentology, process oriented facies analysis and applied stratigraphy in the context of cyclic sea level and climate change through time. Class work includes several field trips to collect samples for physical and chemical analysis. Laboratory.

313 – Fluvial Geomorphology (4)

Prerequisites: GEOL 112 or GEOG 111. Use of both classical (qualitative) and modern (quantitative) geomorphological methods to study and understand fluvial processes acting on the surface of the earth, and how landforms and landscapes created by these processes control the global environment. The class will combine field-based observations with in-class instruction. Laboratory.

315 – Hydrogeology (4)

Prerequisite: GEOL 112. An introduction to surface water and groundwater flow; the hydrologic cycle; aquifer testing; flow to wells; contaminant transport; and field and laboratory instruments. Cross-listed as EESC 315. Laboratory.

325 – Environmental Geochemistry (4)

Prerequisites: GEOL 112 and CHEM 112. Study of chemical processes operating at or near the surface of the Earth, in bedrock, soils, streams, the oceans and the atmosphere. Particular attention is given to environmental applications. Cross-listed as EESC 325. Laboratory.

335 – Plate Tectonics (4)

Prerequisite: GEOL 112. This laboratory course offers a comprehensive study of lithospheric plate movements using information derived from seismology, paleomagnetism, petrology and tectonics. Selected topics also include a historical review of the development of the theory of plate tectonics, geologic and geophysical events at plate boundaries and an evaluation of evidence regarding plate-driving forces. Laboratory.

340 – Energy Resources and Technology (3)

Prerequisite: One from BIOL 132, 126, CHEM 112, GEOL 112, EESC 110 or PHYS 106. Intended primarily for science majors, this course investigates the basic science and technology relating to alternative energy sources and fossil fuels. Students who complete this class will have a greater technical understanding of energy sources and the methods used to tap them. Cross-listed as EESC 340.

355 – Icehouse – Greenhouse Earth (3)

Prerequisites: GEOL 111 or EESC 110. This course examines the history of the Earth's climate system in the context of the two primary modes: Icehouse and Greenhouse. Through critical evaluation of primary literature, written assignments and oral presentations, students will gain an appreciation of the magnitude of temporal and spatial climate reorganizations through time and develop an in-depth understanding of both long and short term cyclic changes that have contributed to the development of our modern climate system. Cross-listed with EESC 355.

360 – Environmental Exploration (2-4)

Specialized courses with a significant field component not offered on a regular basis. Study of selected environments along with relevant geological issues with a focus on active exploration and research. Overnight trips and extra fees required. Permission of instructor required to register. Cross-listed as EESC 360.

412 – Structural Geology (4)

Prerequisite: GEOL 301. Analysis and interpretation of structural features of the Earth's crust such as folds and faults. Laboratory.

421 – Advanced Topics in Geology (2-4)

Prerequisite: permission of the instructor. Specialized topics not offered on a regular basis.

491 – Individual Study (1-4)

Prerequisite: permission of the instructor. Investigation of a topic which may include laboratory, field work and literature research. Course of study determined by supervising instructor and student.

493 – Honors Research (4)

Prerequisites: EESC 491 or GEOL 491 and permission of instructor. Independent research project which may include field and/or laboratory work. Course of study determined by supervising research advisor and student. Successful completion of a written thesis and oral defense is required, and will result in the student earning departmental Honors at graduation.

499 – Internship (Credits variable)

Prerequisite: Junior or Senior Geology major in good academic standing. Supervised off campus experience developed in consultation with the department. A maximum of three (3) credits may count toward the Geology major requirements.

Proposed New Catalog Description: (incl. new statement in red regarding location of Catalog text)

Requirements for the Environmental Science-Natural Track major, Environmental Science-Social Track major, and Environmental Sustainability minor are listed in the Catalog under Environmental Science.

The Geology Program

Geology is the scientific study of the Earth, including its composition, dynamics, surface processes, and history. Our Geology major provides broad training in a diverse range of courses appropriate for students interested in pursuing a professional career or graduate studies in the earth sciences and related fields. The program also provides part of the necessary background for teaching the earth sciences. Because geology is an interdisciplinary science, students are encouraged to add courses from other fields. For example, students interested in paleontology are advised to take appropriate biology classes, whereas

courses in chemistry and physics are important in disciplines such as seismology, geochemistry, hydrology, and studies of energy and mineral resources.

The Environmental Geology major is designed for students with a specific interest in Earth's surficial processes, especially as they relate to human interaction with the landscape and environment. Environmental geology, therefore, examines topics such as hydrogeology, soil and water chemistry, and geomorphology that lie at the interfaces of the lithosphere, the hydrosphere, and climate system.

Students majoring in geology or environmental geology are encouraged to do independent study and research during their senior year. Financial support for student research is available. Qualified students may also choose to do an internship with a professional agency during either their junior or senior year. Students with a 3.00 overall grade-point average and a 3.25 average in geology courses may pursue Honors in Geology or Environmental Geology by completing an independent research project and writing and defending a thesis.

The Department has modern laboratories in the Jepson Science Center equipped with advanced analytical instruments to support classroom instruction and to provide opportunities for research. Major equipment includes petrographic microscopes, an x-ray diffractometer, a magnetic susceptibility instrument, and lab facilities for paleontology, sedimentology and geochemistry. The Jepson Science Center has a variable pressure scanning electron microscope with chemical capabilities that is shared by the science disciplines. For geological fieldwork, the department has GPS equipment, research boats, coring and surveying equipment, and for classroom study, an extensive collection of rocks, minerals, and fossils. The department also maintains a computer lab/classroom equipped with the latest Geographic Information Systems (GIS) software.

Majors are encouraged to fulfill the general education experiential learning requirement by completing URES 197, **EESC 481, EESC 491, EESC 493, or EESC 499**. Alternatively, majors may meet this requirement by participating in an approved supervised on-campus or off-campus summer research experience developed in consultation with the department (such as the UMW Summer Science Research Program or a similar program at another college or university). To complete the experiential learning requirement through a summer research experience, contact the department chair for more details.

[Requirements for Geology Major

Forty (40) credits, to include **Geology EESC 111, 112, 240, 301, 302, 311, and 412**; and an additional twelve (12) credits ~~in other geology courses including Geology from EESC 201, 205 (or Geography 250 or Geographic Information Science 200), 210, and 211, (must be taken concurrently and count as one elective) or other geology courses at the 300-level and above~~ **307, 313, 315, 325, 335, 340, 355, 360, 421, 481, 491, 493, or 499**. Chemistry 331 or 332 may be substituted for up to four (4) of these credits. ~~Environmental Science 307 and 493 may also be included for geology elective credit.]~~

Requirements for Environmental Geology Major

Forty-one to forty-four (41-44) credits to include Chemistry 111 and 112, Geology 111, 112, 240, 301, 311, and 315, and either Geology 205 or Geography 250 or Geographic Information Science 200. In addition, choose two elective courses from the following: Geology 210 and 211 (210 and 211 must be taken concurrently and will count as one elective), 313, 325, 340, 360, 412, 493; Environmental Science 307, 326, 330, 493.

Geology Course Offerings (EESC)

111 – Our Dynamic Earth (4)

The modern view of the Earth as a dynamic, constantly-changing planet and the impact of geological processes on our lives. Discussions will include the origin of the solar system and Earth, how earthquakes and volcanoes result from heat-driven plate tectonic processes and our ongoing attempts to predict such hazardous events, and how Earth's rocks and minerals are ingrained in our everyday lives. Streams and groundwater processes, and cycles of mountain uplift and erosion that continuously alter the Earth's surface, will also be examined. Laboratory.

112 – Evolution of the Earth (4)

Prerequisite: EESC 110 or **EESC 111**. History of the Earth with emphasis on surficial processes, evolution of life, **energy resources**, and climate change. Laboratory.

201 – Paleontology (4)

Prerequisite: **EESC 111** or BIOL 121 or **BIOL 125**. This course introduces the fundamental procedures and applications of paleontology that include taxonomy, taphonomy, biostratigraphy, paleoecology and environmental science. The course format is project oriented with student opportunities to collect, describe and analyze fossil specimens retrieved from rock samples and sediment cores. The lab will provide a survey of the major fossil groups and introduce modern analytical procedures. Laboratory.

205 – GIS Applications in Environmental Science and Geology (4)

This course emphasizes the acquisition of spatial data and their display and analysis within ArcGIS geographic information system software. The class also includes an introduction to the use of global positioning system instruments for data collection. **Laboratory.**

210 – Oceanography (3)

Prerequisite: **EESC 111**. An introduction to the oceans. Physical and chemical processes affecting seawater; the geology of the seafloor; biological productivity in the oceans; and environmental challenges involving the oceans.

211 – Oceanography Laboratory (1)

Corequisite: EESC 210. Laboratory investigation of the chemical and physical properties of seawater; the tides; bathymetric measurements; coastal navigation; and marine biological processes. One or more field trips may be scheduled.

221 – Environmental Geology (3)

Prerequisite: **EESC 111**. Interaction of geologic phenomena and processes with society and the biosphere.

240 – Field Methods in Environmental Science and Geology (4)

Prerequisites: EESC 110 or **EESC 111** or GEOG 110. The Earth & Environmental Sciences rely heavily on mapping and collection of physical, chemical, and biological field data. Students enrolled in the course will complete weekly laboratory and hands-on exercises to learn the essential field skills necessary to advance their careers in the earth sciences as technicians, academics, and/or educators. This introductory field course will provide a solid foundation to prepare students for advanced earth science study and/or a general introduction to the field methods within the discipline.

301 – Mineralogy (4)

Prerequisite: **EESC 111**; prerequisite or co-requisite CHEM 111. Study of Earth's major rock forming minerals, and those of economic value, in hand sample, microscopic thin section and

through field studies. Course is conducted as a mix of lecture and laboratory activities. Laboratory.

302 – Petrology (4)

Prerequisite: **EESC 301**; prerequisite or corequisite CHEM 112. Study of metamorphic and igneous processes and important rock types in hand sample, microscopic thin-section and through field studies. Course is conducted as a mix of lecture and laboratory activities. Laboratory.

307 – Environmental Soil Science (3)

Prerequisites: EESC 110 or 111, or GEOG 111; prerequisite or corequisite: CHEM 112. An introduction to soil formation processes; soil classification (both basic classification and soil taxonomy); physical properties of soil; soil chemistry; and discussion of soil as an environmental interface.

311 – Sedimentation and Stratigraphy (4)

Prerequisite: **EESC 111**; prerequisite or corequisite CHEM 111; recommended: **EESC 301**. This course provides an overview of the concepts associated with sedimentary rock formation, including theoretical sedimentology, process oriented facies analysis and applied stratigraphy in the context of cyclic sea level and climate change through time. Class work includes several field trips to collect samples for physical and chemical analysis. Laboratory.

313 – Fluvial Geomorphology (4)

Prerequisites: **EESC 111** or GEOG 111. Use of both classical (qualitative) and modern (quantitative) geomorphological methods to study and understand fluvial processes acting on the surface of the earth, and how landforms and landscapes created by these processes control the global environment. The class will combine field-based observations with in-class instruction. Laboratory.

315 – Hydrogeology (4)

Prerequisite: **EESC 111**. An introduction to surface water and groundwater flow; the hydrologic cycle; aquifer testing; flow to wells; contaminant transport; and field and laboratory instruments. Laboratory.

325 – Environmental Geochemistry (4)

Prerequisites: **EESC 111** and CHEM 112. Study of chemical processes operating at or near the surface of the Earth, in bedrock, soils, streams, the oceans and the atmosphere. Particular attention is given to environmental applications. Laboratory.

335 – Plate Tectonics (4)

Prerequisite: **EESC 111**. This laboratory course offers a comprehensive study of lithospheric plate movements using information derived from seismology, paleomagnetism, petrology and tectonics. Selected topics also include a historical review of the development of the theory of plate tectonics, geologic and geophysical events at plate boundaries and an evaluation of evidence regarding plate-driving forces. Laboratory.

340 – Energy Resources and Technology (3)

Prerequisite: One from BIOL 132, 126, CHEM 112, EESC 110, **EESC 111**, or PHYS 106. Intended primarily for science majors, this course investigates the basic science and technology relating to alternative energy sources and fossil fuels. Students who complete this class will have a greater technical understanding of energy sources and the methods used to tap them.

355 – Icehouse – Greenhouse Earth (3)

Prerequisites: EESC 110 or **EESC 111**. This course examines the history of the Earth's climate system in the context of the two primary modes: Icehouse and Greenhouse. Through critical evaluation of primary literature, written assignments and oral presentations, students will gain an appreciation of the magnitude of temporal and spatial climate reorganizations through time and develop an in-depth understanding of both long and short term cyclic changes that have contributed to the development of our modern climate system.

360 – Environmental Exploration (2-4)

Specialized courses with a significant field component not offered on a regular basis. Study of selected environments along with relevant geological issues with a focus on active exploration and research. Overnight trips and extra fees required. Permission of instructor required to register.

412 – Structural Geology (4)

Prerequisite: **EESC 301**. Analysis and interpretation of structural features of the Earth's crust such as folds and faults. Laboratory.

*421 – **Special Topics** (2-4)*

Prerequisite: permission of the instructor. Specialized topics not offered on a regular basis.

481 – Readings (1-2)

Readings in the environmental and/or geologic literature selected by the student, who is guided by a faculty member. Open to majors by permission of the department.

491 – Individual Study (1-4)

Prerequisite: permission of the instructor **and the department**. Investigation of a topic which may include laboratory, field work, and literature research. Course of study determined by supervising instructor and student.

493 – Honors Research (4)

Prerequisites: EESC 491 and permission of instructor. Independent research project which may include field and/or laboratory work. Course of study determined by supervising research advisor and student. Successful completion of a written thesis and oral defense is required, and will result in the student earning Departmental Honors at graduation.

499 – Internship (Credits variable)

Prerequisite: Junior or Senior major in good academic standing. Supervised off campus experience developed in consultation with the department. A maximum of three (3) credits may count toward the Geology major requirements.