COLLEGE OF MARINE AND EARTH STUDIES

UNDERGRADUATE PROGRAMS

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The College of Marine and Earth Studies (CMES) is dedicated to advancing the knowledge, use, and conservation of the earth, its oceans and its other resources. The college's goal is to produce well-rounded scientists and policy specialists who have the broad vision and interdisciplinary background necessary to address the sweeping, interrelated issues that are part of the study of ocean and earth systems.

With a deep commitment to excellence in academics, research and public outreach, CMES plays a leading role in educating future marine and earth scientists, educators and policy specialists. The classrooms and labs at both the Newark and Lewes campuses are active and engaging learning environments where students work closely with the premiere faculty of the college.

Undergraduate students interested in the Earth and Ocean are connected to CMES in a number of ways: a) As majors in Earth Science Education, Geology, or Environmental Science; b) As students getting a minor in Marine Studies, Geology, or Coastal and Marine Geoscience; and c) Participating in research opportunities with CMES faculty through University of Delaware Undergraduate Research Program (www.urp.udel.edu) and other research opportunities.

For detailed information about the college's research and facilities, please visit the CMES website: www.ocean.udel.edu. For information specific to Geological Sciences, see: www.geosci.udel.edu. CMES Faculty listings can be found at: www.ocean.udel.edu/people/faculty.aspx.

DEGREE PROGRAM OFFERINGS

Undergraduate students in CMES can major in Earth Science Education or Geology. Geology majors can select a concentration in Paleobiology or Coastal and Marine Geoscience. Students can also major in Environmental Science, a collaborative degree program. Housed in the Department of Geography, the Environmental Science program is offered jointly by CMES, and the departments of Geological Sciences, Geography and Biological Sciences. Students majoring in Environmental Science can select from several concentrations including the Geological Environment or the Marine Environment.

Students interested in studying the Earth and Ocean may also choose to minor in Marine Studies, Geology, or Coastal and Marine Geoscience.

DEAN'S SCHOLAR PROGRAM

The Dean's Scholar Program exists to serve the needs of students whose clearly defined educational goals cannot be effectively achieved by pursuing the standard curricula for all existing majors, minors, and interdepartmental majors sponsored by the University. Driven by an overarching passion or curiosity that transcends typical disciplinary bounds and curricula, a Dean's Scholar's intellectual interests may lead to broad interdisciplinary explorations of an issue or to more intense, in-depth studies in a single field at a level akin to graduate work. In consultation with faculty advisors and the assistant or associate dean of their college, Dean's Scholars design an imaginative and rigorous individual plan of study to meet the total credit hours required for graduation. Contact the assistant dean in the College of Marine and Earth Studies or go to www.udel.edu/deansscholar/ for more information and the application.

SEMESTER-IN-RESIDENCE PROGRAM

The College of Marine and Earth Studies Semester-In-Residence Program is an intensive residential research experience for undergraduate science majors. Those students participating in the program spend the fall semester living, working and studying at the Hugh R. Sharp Campus in the coastal city of Lewes at the mouth of the Delaware Bay. The program is designed to provide junior or senior students (with at least a 3.0 cumulative GPA) the opportunity to explore marine studies through graduate-level course work and seminars as well as an individual research project guided by a faculty advisor.

Students have access to all the amenities of CMES's thriving marine research and teaching program, including offices, research and teaching laboratories, classrooms, computer facilities, and a library. Cannon and Smith laboratories are equipped with recirculating seawater systems and controlled-environment rooms for maintaining saltwater fish and plants.

Smith Lab includes a shellfish hatchery, algal culture facilities, fish aquaria, microbiology labs, and greenhouse space for halophyte (salt-tolerant plant) research.

Two smaller laboratories in Lewes contain specialized research facilities. Henlopen Lab, adjacent to Cape Henlopen State Park, is

home to one of the world's only tilting wind-wave tanks for studying physical phenomena at the air-sea interface. The Pollution Ecology Laboratory serves as supplemental space for marine geological research.

The Adrian S. Hooper Marine Operations Building and harbor support the seagoing research activities of the college. The harbor is home port of the 146-foot Hugh R. Sharp research vessel. Several smaller vessels are available for scientific exploration and sampling in nearby Delaware Bay and coastal Atlantic waters.

The nature of this program necessitates that interested students begin planning fairly early in their college career to incorporate this special semester into their curriculum. The program can provide a valuable, advance look at the graduate school experience.

For more information, contact:
Dr. Charles Epifanio
University of Delaware
College of Marine and Earth Studies
700 Pilottown Road
Lewes, DE 19958-1298
e-mail: epi@udel.edu

NSF Marine Sciences Summer Internship

CMES also offers an NSF-supported Research for Undergraduates summer program. Each summer, with support from the National Science Foundation (NSF), CMES awards internships to approximately 10 science, engineering, and mathematics undergraduates from around the country, giving them the opportunity to conduct 10 weeks of guided research at CMES' Hugh R. Sharp Campus in Lewes. Interns work on a research project in chemical, physical, or biological oceanography, marine biology, marine geology, or marine biochemistry; participate in a research cruise aboard the 146-foot research vessel Hugh R. Sharp; and present their results in oral and written reports at the end of the summer. They also attend weekly seminars for which they receive one credit. Student support includes a stipend, housing, tuition for the one-credit course, and travel assistance. Applicants must be citizens or permanent residents of the United States and its possessions and must be enrolled in a degree program leading to a bachelor's degree. Students between their junior and senior years receive preference. The deadline for applications is usually in late February, with student selection and notification made by April of each year.

For more information, contact:
Dr. Ana I. Dittel
University of Delaware
College of Marine and Earth Studies
700 Pilottown Road
Lewes, DE 19958-1298
e-mail: adittel@udel.edu

Marine Policy Internship

Undergraduate students from various disciplines may serve as interns in the Gerard J. Mangone Center for Marine Policy at CMES and work on a range of research and policy analysis activities with graduate students, faculty, and national and international agencies. The center: conducts an active regional, national and international research program; provides policy advice to governmental and nongovernmental agencies; and organizes conferences, publications, international exchanges, and a visitors program. Major emphases include implementation of the World Summit on Sustainable Development agreements related to the oceans and coasts, the theory and practice of integrated coastal management, the management of coastal ecosystem health, and marine biotechnology.

For more information, contact:
Dr. Biliana Cicin-Sain, Director
Gerard J. Mangone Center for Marine Policy
College of Marine and Earth Studies
301 Robinson Hall
Newark, DE 19716
email: bcs@udel.edu

Physical Ocean Science and Engineering (POSE) Internship

Undergraduate students with a background in physics, mathematics and engineering can undertake advanced study of contemporary research topics in arctic physical oceanography, coastal engineering, underwater acoustics, air-sea interaction, and global climate change.

The POSE internship program is designed to provide undergraduates with hands on experience in physical ocean research. Students work one-on-one with a professor and have access to the latest research facilities including the college's 146-foot research vessel, R/V Hugh R. Sharp, and a number of state-of-the-art laboratory facilities located on both on the Newark and at the Hugh R. Sharp campus in Lewes.

The program typically runs for 2 months during June and July and includes a monthly stipend and housing assistance.

For more information, contact:
Dr. Moshen Badiey, Director
Physical Ocean Science and Engineering Program
107 Robinson Hall
Newark, DE 19716
email:badiey@udel.edu

Marine Studies

Telephone: (302) 831-2841
www.ocean.udel.edu

The College of Marine and Earth Studies offers several opportunities for students to pursue academic work in the field of marine studies.

While there is not a formal undergraduate degree in Marine Studies, CMES offers a minor in Marine Studies and many other course offerings to students in various disciplines. Additionally, the college works closely with departments such as Biological Sciences, Physics, Chemistry/Biochemistry, Geological Sciences, Geography and Engineering to assist those students who desire to undertake graduate work in Marine Studies after graduation.

MINOR IN MARINE STUDIES

The Minor in Marine Studies is designed for those students who are interested in gaining a deeper understanding of the world ocean, the seabed, and the coastal zone. Students may choose either of two tracks: Physical Ocean Science or Marine Ecosystems. Students choosing either track must complete 9 credits of required courses and 9 credits of electives. Ordinarily, students in the minor would enroll in MAST 492, Seminar: Marine Environmental Case Studies after all other requirements for the minor have been met.

The Minor in Marine Studies consists of 18 credits: three required courses and three elective courses of three credits each. From the elective courses, students should take at least two courses at the 400 or 600 level, and at least one course with an "MAST" listing. Students must receive a grade of "C-" or better for the course to count toward completion of the minor.

Required Courses **. 9**
MAST 482 Introduction to Ocean Sciences
MAST 492 Seminar: Marine Environmental Case Studies

MAST 402/602 Introduction to Physical Ocean Science
or
MAST 427/627 Marine Biology

Tracks:

Physical Ocean Science (pick 3 of 6) 9
GEOG 420 Atmospheric Physics
GEOG 357 Paleoclimatology
GEOL 414/614 Quaternary Geology and Geochronology
GEOL 434/634 Geology of Coasts
MAST 437/637 Geological Oceanography
MAST 628 Offshore Wind Power: Science, Engineering & Policy

Marine Ecosystems (pick 3 of 6) 9
BISC 302 General Ecology
MAST/ENWC 314 Comparative Terrestrial & Marine Ecology
MAST 421/621 Coastal Field Biology
MAST 451/651 Marine Invertebrate Diversity
MAST 629-011 Topics in Marine Ecology: Ichthyology
BISC 637 Population Ecology
Substitutions may be made for courses in a track ass approved by the coordinator of the minor

TOTAL CREDITS 18

Undergraduate Course Offerings in Marine Studies

CMES also offers courses that are available to students from various science and non-science disciplines. Many of these courses can be used to fulfill electives or breadth requirements in specific degree programs in other colleges. Students should check with their advisor to confirm appropriateness of the coursework for their specific academic program. Several of the most popular CMES courses are:

"The Ocean" (MAST 200) is designed primarily for non-science majors and provides an overview of how the ocean works. This course integrates basic physical, chemical, geological, and biological principles while exploring topics ranging from why the ocean is salty to the status of the world's fisheries.

A more advanced course, "Introduction to Ocean Science" (MAST 482), is geared to junior and senior students pursuing majors and careers in environmental studies, physical and life sciences, or engineering. It is designed both as a stand-alone course and to prepare students for graduate-level oceanography courses. It provides a more detailed introduction to the ocean including seafloor geography, the chemistry of water and sediments, the physics of ocean circulation, and the biology of the seas. The course takes a problem-solving approach requiring introductory calculus, chemistry, and physics. Subjects covered include global climate change, marine biodiversity, hydrothermal vent communities, coastal pollution, waning fish stocks, and the ozone hole.

Undergraduate students with advanced interests may also enroll in entry-level graduate courses in marine studies with the instructor's permission. While some classes are taught at the CMES research complex in Lewes, 90 miles south of the main campus, interactive television (ITV) classrooms link the two campuses and allow students to attend class in Newark without commuting to Lewes.

Geological Sciences

Telephone: (302) 831-2569
http://www.geosci.udel.edu

Housed in Penny Hall, the Department of Geological Sciences offers undergraduate major programs leading to B.A. degrees in Geology and in Earth Science Education. The Department offers major programs leading to B.S. degrees in Geology. Students pursuing a Bachelor of Science in Geology can take a concentration in Geophysics, Coastal and Marine Geoscience and Paleobiology. Students from other majors can earn a minor in Geology or Coastal and Marine Geoscience. Environmental Science majors can earn a minor in Geology while earning a B.S. in Environmental Science.

The department has ready access to an x-ray diffractometer, Chirp marine profiler, gas and liquid chromatographs, ground penetrating radar, multichannel seismic equipment, a variety of coring and drilling equipment, tripod mounted lidar, an electronic total station, an Autonomous Underwater Vehicle equipped with sidescan sonar and other sensors, and a variety of boats, including a 25-ft. vessel outfitted for geological research in the Delaware Bay. Through its cooperative programs with several nearby institutions, including the Delaware Geological Survey, the department has ready access to nearly all other commonly used tools of geological and geophysical research.

DEGREE: BACHELOR OF ARTS
MAJOR: GEOLOGY

CURRICULUM CREDITS

These university-level, college-level and breadth requirements apply to all College of Marine & Earth Studies Bachelor of Arts degrees.

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (minimum grade C-) 3

First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68). 3

Approved course or courses stressing multicultural, ethnic, and/or gender-related course content (see pages 69-71) 3

COLLEGE REQUIREMENTS (adapted from the College of Arts & Sciences)

Second Writing (minimum grade C-) 3
A second writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content. This course must be taken after completion of 60 credit hours. Appropriate writing courses are normally designated in the semester's Registration Booklet. (See list of courses approved for second writing requirement, In the Arts and Sciences section of this catalog.)

Foreign Language. 0-12
Completion of the intermediate-level course (107 or 112 or 214) in a given language. Number of credits needed and initial placement will depend on number of years of high school study of foreign language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

BREADTH REQUIREMENTS

For listings of courses approved to fulfill group requirements, see the breadth requirement listings in the Arts and Sciences section of this catalog.

Group A 9
Analysis and appreciation of the creative arts and humanities. Total credits must include courses representing at least two departments or appropriate instructional units.

Group B 9
The study of culture and institutions over time. Nine credits of courses representing at least two departments or appropriate instructional units.

Group C 9
Empirically based study of human beings and their environment. Nine credits of courses representing at least two departments or appropriate instructional units.

Group D 10
The study of natural phenomena through experiment or analysis. Ten credits of courses representing at least two departments or appropriate instructional units and including a minimum of one course with an associated laboratory.

If the grade earned is sufficient, a course may be applied toward more than one requirement (e.g., breadth and major requirements), but the credits are counted only once toward the total credits for graduation. If all but one course in a group has been taken in one department or program, a course cross-listed with that program will not satisfy the distribution requirement.

MAJOR REQUIREMENTS
One of the following:. 4
GEOL 105/115 Geologic Hazards and their Human Impact and Laboratory
Note: GEOL 115 must be taken concurrently with GEOL 105
GEOL 107 General Geology
GEOL 113 Earth Science
GEOL 300 Earth's Materials I: Minerals 4
GEOL 302 Earth's Materials II: Rocks 4
GEOL 303 Earth's Surface I: Surficial Processes 4
GEOL 304 Earth's Surface II: Stratigraphy 4
GEOL 305 Earth Lithosphere I: Structural Geology and Plate Tectonics 4
GEOL 306 Earth's Lithosphere II: Field Geology 4
GEOL 307 Earth's History I: Paleobiology 4
GEOL 308 Earth's History II: Earth System Science 4
CHEM 103/104 General Chemistry 8
PHYS 201/202 Introductory Physics 8

Mathematics courses through college-level trigonometry 3-4

ELECTIVES
After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF ARTS
MAJOR: EARTH SCIENCE EDUCATION

CURRICULUM CREDITS

Students must complete the university-level, college-level and breadth requirements for College of Marine & Earth Studies Bachelor of Arts degrees.

MAJOR REQUIREMENTS
GEOL 105/115 Geologic Hazards and their Human Impact and Laboratory 4
GEOL 107 General Geology 4
GEOL 300 Earth's Materials I: Minerals 4
GEOL 303 Earth's Surface I: Surficial Processes 4
GEOL 306 Earth's Lithosphere II: Field Geology 4
GEOG 101 Physical Geography 3
GEOG 220 Meteorology 3
GEOG 235 Conservation of Natural Resources 3

One of the following 3
GEOG 343 Climatic Geomorphology
GEOG 255 Applied Climatology

PHYS 133 Introduction to Astronomy 4
PHYS 201/202 Introductory Physics I and II 8
CHEM 103 General Chemistry 4
BISC 195 Biological Evolution 3
MATH 221 Calculus I 3
MAST 200 The Oceans 3
A grade of C- or better is required in BISC 195, MAST 200, PHYS 133, and SCEN 491 and all of the required EDUC, GEOG, and GEOL courses.

EDUC 413 Adolescent Development and Educational Psychology 4
EDUC 414 Teaching Exceptional Adolescents 3
EDUC 419 Diversity in Secondary Education 3
EDUC 420 Reading in the Content Area 1
EDUC 430 Classroom Management in Schools 1
EDUC 400 Student Teaching 9
SCEN 491 Teaching Science in Secondary Schools 4

To be eligible to student teach, Earth Science Education students must have an overall GPA of 2.50 with a GPA of 2.75 in BISC 195, MAST 200, PHYS 133 and their geology and geography courses. They must also pass a teacher competency test as established by the University Council on Teacher Education. Students must consult with the teacher education program coordinator (see list on page 215) to obtain the student teaching application and other information concerning student teaching policies.

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE
MAJOR: GEOLOGY

CURRICULUM CREDITS

These university-level, college-level and breadth requirements apply to all College of Marine & Earth Studies Bachelor of Science Degrees.

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (minimum grade C-) 3

First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

Approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 69-71) 3

COLLEGE REQUIREMENTS (Adapted from the College of Arts and Sciences; see page 231)
Second Writing (minimum grade C-) 3
Foreign Language:. 0-12

BREADTH REQUIREMENTS
For listings of courses approved to fulfill group requirements, see the breadth requirement listings in the Arts and Sciences section of this catalog.
Group A 6
Group B 6
Group C 6

MAJOR REQUIREMENTS
One of the following 4
GEOL 107 General Geology
GEOL 105/115 Geologic Hazards and their Human Impact and Laboratory
GEOL 113 Earth Science

GEOL 300 Earth's Materials I: Minerals 4
GEOL 302 Earth's Materials II: Rocks 4
GEOL 303 Earth's Surface I: Surficial Processes 4
GEOL 304 Earth's Surface II: Stratigraphy 4
GEOL 305 Earth Lithosphere I: Structural Geology and Plate Tectonics 4
GEOL 306 Earth's Lithosphere II: Field Geology 4
GEOL 307 Earth's History I: Paleobiology 4
GEOL 308 Earth's History II: Earth System Science 4
MATH 241/242 Analytic Geometry and Calculus A and B 8
CHEM 103/104 General Chemistry 8
PHYS 201/202 Introductory Physics I and II 8

Geology Electives 9-10
(GEOL 385 or any 400-level or other GEOL courses approved in writing by department, including field courses taken as transfer work)
A minimum grade of C- is required for any GEOL courses that count for the major.

Two of the following: 6-8
GEOG 250 Computer Methods in Geography
GEOG 372 Geographic Information Systems
GEOG 471 Advanced Geographic Information Systems
FREC 480 Geographic Information Systems in Natural Resource Management
MATH 243 Analytic Geometry and Calculus C
MATH 302 Ordinary Differential Equations

Other courses as approved in writing.

ELECTIVES
After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE
MAJOR: GEOLOGY
CONCENTRATION: GEOPHYSICS

CURRICULUM CREDITS

Students must complete the university-level, college-level and breadth requirements for College of Marine & Earth Studies Bachelor of Science degrees.

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (minimum grade C-) 3

First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 69-71) 3

COLLEGE REQUIREMENTS (Adapted from the College of Arts and Sciences, see page 231)
Second Writing: (minimum grade C-) 3
Foreign Language: 0-12

BREADTH REQUIREMENTS For listings of courses approved to fulfill group requirements, see the breadth requirement listings in the Arts and Sciences section of this catalog.
Group A 6
Group B 6
Group C 6

MAJOR REQUIREMENTS
Within the Department
One of the following 4
GEOL 107 General Geology
GEOL 105/115 Geologic Hazards and their Human Impact and Laboratory
GEOL 113 Earth Science

GEOL 300 Earth's Materials I: Minerals 4
GEOL 302 Earth's Materials II: Rocks 4
GEOL 303 Earth's Surface I: Surficial Processes 4
GEOL 304 Earth's Surface II: Stratigraphy 4
GEOL 305 Earth Lithosphere I: Structural Geology and Plate Tectonics 4
GEOL 306 Earth's Lithosphere II: Field Geology 4
GEOL 307 Earth's History I: Paleobiology 4
GEOL 308 Earth's History II: Earth System Science 4
GEOL 453 Geophysics I 3
GEOL 454 Geophysics II 3
GEOL 405 Introduction to Research 3
PHYS 207/208/209 Fundamentals of Physics I, II, and III 11
PHYS 645 Electronics for Scientists 3
MATH 241/242/243 Analytic Geometry and Calculus A, B and C 12
MATH 302 Ordinary Differential Equations I 3

One of the following 3-4
GEOG 250 Computer Methods in Geography
CISC 106 General Computer Science for Engineers

CREDITS TO TOTAL A MINIMUM OF 125

DEGREE: BACHELOR OF SCIENCE
MAJOR: GEOLOGY
CONCENTRATION: PALEOBIOLOGY

CURRICULUM CREDITS

Students must complete the university-level, college-level and breadth requirements for College of Marine & Earth Studies Bachelor of Science degrees.

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (minimum grade C-) 3

First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 69-71) 3

COLLEGE REQUIREMENTS (Adapted from the College of Arts and Sciences, see page 231)
Second Writing: (minimum grade C-) 3
Foreign Language: 0-12

BREADTH REQUIREMENTS For listings of courses approved to fulfill group requirements, see the breadth requirement listings in the Arts and Sciences section of this catalog.
Group A 6
Group B 6
Group C 6

MAJOR REQUIREMENTS
One of the following 4
GEOL 107 General Geology
GEOL 105/115 Geologic Hazards and their Human Impact and Laboratory
GEOL 113 Earth Science

GEOL 300 Earth's Materials I: Minerals 4
GEOL 302 Earth's Materials II: Rocks 4
GEOL 303 Earth's Surface I: Surficial Processes 4
GEOL 304 Earth's Surface II: Stratigraphy 4
GEOL 305 Earth Lithosphere I: Structural Geology and Plate Tectonics 4
GEOL 306 Earth's Lithosphere II: Field Geology 4
GEOL 307 Earth's History I: Paleobiology 4
GEOL 308 Earth's History II: Earth System Science 4
GEOL 405 Introduction to Research 3
Geology Electives 6
(GEOL 385 or any 400-level GEOL or other GEOL courses approved in writing by the department, including field courses taken as transfer work.)
BISC 207/208 Introductory Biology I and II 8
BISC 495 Evolution 3
CHEM 103/104 General Chemistry 8

One of the following 3
BISC 302 General Ecology
BISC 321 Environmental Biology

Two of the following 8
BISC 303 Genetic and Evolutionary Biology
BISC 371 Introduction to Microbiology
BISC 480 Vertebrate Natural History

One of the following 3
MATH 210 Discrete Mathematics I
MATH 230 Finite Mathematics with Applications
MATH 241 Analytic Geometry and Calculus A 4
MATH 205 Statistical Methods 4

ELECTIVES
After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirements for the degree.

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE
MAJOR: GEOLOGY
CONCENTRATION: COASTAL AND MARINE GEOSCIENCE

CURRICULUM CREDITS

Students must complete the university-level, college-level and breadth requirements for College of Marine & Earth Studies Bachelor of Science degrees.

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (minimum grade C-) 3

First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 69-71) 3

COLLEGE REQUIREMENTS (Adapted from the College of Arts and Sciences)
Second Writing: (minimum grade C-) 3
Foreign Language: 0-12

BREADTH REQUIREMENTS For listings of courses approved to fulfill group requirements, see the breadth requirement listings in the Arts and Sciences section of this catalog.
Group A 6
Group B 6
Group C 6

MAJOR REQUIREMENTS
One of the following 4
GEOL 107 General Geology
GEOL 105/115 Geologic Hazards and their Human Impact and Laboratory
GEOL 113 Earth Science

GEOL 300 Earth's Materials I: Minerals 4
GEOL 302 Earth's Materials II: Rocks 4
GEOL 303 Earth's Surface I: Surficial Processes 4
GEOL 304 Earth's Surface II: Stratigraphy 4
GEOL 305 Earth Lithosphere I: Structural Geology and Plate Tectonics 4
GEOL 306 Earth's Lithosphere II: Field Geology 4
GEOL 307 Earth's History I: Paleobiology 4
GEOL 308 Earth's History II: Earth System Science 4
GEOL 431 Marine Geology 3
GEOL 434/634 Geology of Coasts 3

BISC 207/208 Introductory Biology I and II 8
CHEM 103/104 General Chemistry 8
ENWC/MAST 314 Comparative Terrestrial and Marine Ecology 3
MATH 241/242 Analytic Geometry and Calculus I and II 8
MAST 482 Introduction to Ocean Sciences 3
PHYS 201/202 Introductory Physics I and II 8

Six credits from the following list of courses or any other courses approved in writing by the Department 6
MAST 366 or 466 Independent Study . . . . . 6 (maximum)
(only by prior instructor approval)
MAST 464 Marine Science Summer Internship 3
or
MAST 468 Undergraduate Research . . . . . 3 (at least)
MAST 402/602 Physical Oceanography 3
MAST 606 Ocean and Atmosphere Remote Sensing 3
MAST 427/627 Marine Biology 3
MAST 437/637 Geological Oceanography 3
MAST 646 Chemical Oceanography 3
GEOG/MAST 681 Remote Sensing of Environment 3

CREDITS TO TOTAL A MINIMUM OF 125

MINOR IN GEOLOGY

The minor consists of at least 18 credit hours in geology. The requirements are: GEOL 107 or GEOL 105 and 115, or GEOL 113; plus additional courses at the 300- 400-level to obtain the remaining credits to reach a total of 18.

For Environmental Science majors, the requirements for the minor in Geology are GEOL 107, or GEOL 105 and 115, or GEOL 113; GEOL 303; at least one other GEOL course at the 300-level; plus additional courses at the 300- and 400-level to obtain the remaining credits to reach a total of 18.

MINOR IN COASTAL AND MARINE GEOSCIENCE

A minimum of 18 credits of course work in Coastal and Marine Geoscience must be completed for a minor. The following courses are required (within the stated options); others can be added (as listed below) to obtain additional credits in related disciplines.

CURRICULUM CREDITS

GEOL 107 General Geology
or
GEOL 105/115 Geological Hazards
or
GEOL 113 Earth Science 4

At least one full-year sequence of 300-level courses 8
(e.g. 300-302, 303-304, 305-306, or 307-308
MAST 482 Introduction to Ocean Sciences 3
GEOL 431 Marine Geology 3

TOTAL CREDITS 18

DEGREE: BACHELOR OF SCIENCE
MAJOR: ENVIRONMENTAL SCIENCE

A B.S. degree in Environmental Science is offered through the Department of Geography, in cooperation with the College of Marine and Earth Studies, the Department of Geological Sciences, and the Department of Biological Sciences. Coursework includes geography, biology, geology, and other marine studies classes.

The program emphasizes a broad scientific understanding of the character, function, and analysis of environmental systems. For more information, please visit http://www.udel.edu/Environmentsci. For degree requirements, please see the Department of Geography section of this catalog.