ENVIRONMENTAL SCIENCES GRADUATE PROGRAM
(ESGP)
AREA OF CONCENTRATION IN
BIOGEOCHEMISTRY

PURPOSE

The Area of Concentration in Biogeochemistry is designed for students who have a strong natural science background and want to develop understanding of biogeochemistry. Biogeochemistry is the study of processes that account for the movement of energy and chemicals between components of the earth, including the hydrosphere, lithosphere, and the atmosphere. Examples of biogeochemical processes are nutrient and water cycling in ecosystems, processes that control the composition of the earth's atmosphere, and processes that affect atmospheric dynamics and climate change. The biological component of biogeochemistry includes both humans and other organisms on earth. Within the Biogeochemistry track, students may choose to focus on integrated aspects of terrestrial, aquatic, atmospheric, and marine systems.

PROGRAM OF STUDY

The Biogeochemistry track includes: ESGP Core courses, Methods and Numerical Skills courses, Science Focal Area courses, Elective courses, and Thesis or Project. Total credits required are a minimum of 45 Cr for the M.S. and M.A. degrees and 108 Cr for the Ph.D. degree. Typical Programs of Study will include minimum credits as follows:

Subject Area	M.S. & M.A. Degrees	Ph.D. Degree
ENSC Core Courses	6 Cr	6 Cr
Methods and Numerical Skills	6-8 Cr	9-10 Cr
Science Focal Area Courses	15 Cr min.	30 Cr min.
Electives	11 Cr max.	26 Cr max.
Thesis or Project	6 Cr	36 Cr
Total	45 Cr	108 Cr

ESGP CORE COURSES

ENSC 515 Environmental Perspectives and Methods (3) (Fall term)
ENSC 520 Environmental Analysis (3) (Winter term)

ETHICS

CITI Responsible Conduct for Research (free training through OSU) or equivalent (0 Cr).
Instructions are found at this link: https://gradschool.oregonstate.edu/environmental-sciences/student-handbook-environmental-science-graduate-program

METHODS AND NUMERICAL SKILLS COURSES

6-8 Cr for the M.S. and M.A. degree and **9 Cr minimum** for the Ph.D. degree. These courses are to ensure students have sufficient skills in research methods including mathematics, statistics, and computer science. Courses are to be selected by the student, advisor, and advising committee from the list below and from other offerings.

The courses below are a suggested partial listing and are to be selected by consensus of the graduate advisor, advising committee, and student.

Additional online courses may be included in the program of study that are not listed below.

Search the Schedule of Classes by keyword or prefix for additional course options: https://classes.oregonstate.edu/?keyword=ensc&srcdb=999999&coursetype=coursetype_02&camp=DB,DI

ATS 521 Climate Modeling (4)
BB 585 Applied Bioinformatics (3)
BEE 529 Biosystems Modeling Techniques (3)
BEE 549 Regional Hydrologic Modeling (3)
CS 515 Algorithms and Data Structures (4)
CS 540 Database Management Systems (4)
GEOG 580 Remote Sensing I: Principles and Applications (4)
GEOG 560, 561, 562 GISCIENCE I, II, III : Geographic Information Science (4)
GEOG 565 Spatial-Temporal Variation in Ecology and Earth Science (4)
MTH 551 Numerical Linear Algebra (3)
MTH 552 Numerical Solutions of Ordinary Differential Equations (3)
MTH 553 Numerical Solutions of Partial Differential Equations (3)
ST 511, 512, 513 Methods of Data Analysis (4 each)
ST 515 Design and Analysis of Planned Experiments (3)
ST 522 Introduction to Mathematical Statistics (4)
ST 531 Sampling Methods (3)

SCIENCE FOCAL AREA COURSES

15 Cr minimum for the M.S. and M.A. degree and **30 Cr minimum** for the Ph.D. degree. Focal area Courses are intended to develop basic knowledge in Oceanography, Atmospheric Science, and Geo/soil Science and depth of understanding in biogeochemistry.

The courses below are a suggested partial listing and are to be selected by consensus of the graduate advisor, advising committee, and student.

Additional online courses may be included in the program of study that are not listed below.

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ATS 515 Atmospheric Dynamics I (4)
ATS 670 Large-Scale Interactions of the Ocean and Atmosphere (4)
BB 550 General Biochemistry (4)
BB 551 General Biochemistry II (4)
BEE 512 Physical Hydrology (3)
BEE 558 Nonpoint Source Pollution Assessment and Control (3)
FE 530 Watershed Processes
FE 532 Forest Hydrology (4)
FE 536 Watershed Impacts of Forest Disturbance (4)
FW 556 Freshwater Ecology and Conservation (5)
FW 580 Stream Ecology (3)
GEO 530 Geochemistry (4)
MB 548 Microbial Ecology (4)
OC 522 Ocean Biogeochemical Dynamics (4)
OC 673 Descriptive Physical Oceanography (4)
RNG 555 Riparian Ecohydrology and Management (3)
SOIL 513 Properties, Processes & Functions of Soils (4)
SOIL 525 Mineral-Organic Matter Interactions (3)
SOIL 545 Environmental Soil Chemistry (3)
SOIL 555 Biology of Soil Ecosystems (4)
SOIL 566 Soil Morphology and Classification (4)

ELECTIVE COURSES

11 Cr maximum for the M.S. and M.A. degree and **26 Cr maximum** for the Ph.D. degree. Students will work with their graduate advisor and committee to select electives courses to develop necessary background, and to add breadth and depth to the student's Program of Study.

Search the Schedule of Classes by keyword or prefix for additional course options: https://classes.oregonstate.edu/?keyword=ensc&srcdb=999999&coursetype=coursetype_02&camp=DB,DI

THESIS OR PROJECT

6 Cr for the M.S. and M.A. degrees and **36 Cr** for the Ph.D. degree.