



Oregon State
University

ENVIRONMENTAL SCIENCES
GRADUATE PROGRAM (ESGP) AREA
OF CONCENTRATION IN
QUANTITATIVE ANALYSIS

PURPOSE

The Area of Concentration in Quantitative Analysis is designed for students with interests in mathematics, statistics or computing who wish to augment their quantitative and data analytics skills, study the use of those skills in environmental research, and explore a specific field(s) of application in some depth. The goal is to train environmental scientists who are conversant in mathematics, statistics and computing and thoroughly grounded in the subject matter of a specific concentration, including an awareness of the strengths and limitations of their data.

In addition to satisfying a basic requirement in numerical skills, students select from courses in quantitative analysis, including the planning of experimental and observational studies, the analysis of data accruing from such studies, the analysis of geospatial data, and the quantitative modeling of natural systems. Courses in a science focal area of their choice are also recommended. Entering students should have at least one year of college-level calculus, and sufficient background in environmental science to take graduate courses in their chosen science focal area.

PROGRAM OF STUDY

Course work is divided into 5 categories, including ESGP Core courses, Methods and Numerical Skills courses, Natural Resources 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

6-8 Cr for the M.S. and M.A. degrees 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

AI 530 Big Ideas in AI (3)
ATS 520 Climate Physics (4)
ATS 521 Climate Modeling (4)
ENSC 511 Global Environmental Change: Using Data to Inform Decisions (3)
BEE 512 Physical Hydrology (3)
BEE 529 Biosystems Modeling Techniques (3)
BEE 545 Sediment Transport (4)
BEE 549 Regional Hydrologic Modeling (3)
BEE 568 Bioremediation Engineering (4)

BOT 570 Community Structure and Analysis (5)
CE 562 Digital Terrain Modeling (4)
CH 540, 541, 542 Physical Chemistry I, II, and III (3 each)
CS 546 Networks in Computational Biology (3)
CS 553 Scientific Visualization (4)
FE 557 Techniques for Forest Resource Analysis (4)
FES 523 Quantitative Analysis in Social Science (4)
FES 524 Natural Resource Data Analysis (4)
FOR 524 Forest Biometrics (3)
FW 533 Population Dynamics for Conservation (4)
GEOG 580 Remote Sensing I: Principles and Applications (4)
GEOG 581 Satellite Image Analysis (4)
GEOG 560, 561, 562 GISCIENCE I, II, III: Geographic Information Science (4)
GEOG 565 Spatio-Temporal Variation in Ecology and Earth Science (4)
GEOG 566 Advanced Spatial Statistics and GIScience (4)
H 524 Introduction to Biostatistics (4)
H 543 Exposure Science I (4)
H 547 GIS and Public Health (4)
IB 583 Population Biology (3)
IE 575 Systems Thinking Theory and Practice (4)
MTH 520 Models and Methods of Applied Mathematics (3)
MTH 528 Stochastic Elements in Mathematical Biology (3)
OC 512 Basic MATLAB for Environmental Scientists and Engineers (2)
OC 522 Ocean Biogeochemical Dynamics (4)
OC 523 Ocean Ecological Dynamics (4)
OC 630 Ocean Wave Mechanics I (3)
OC 670 Fluid Dynamics (4)
OEAS 520 The Solid Earth (4)
OEAS 530 The Fluid Earth (4)
OEAS 540 The Biochemical Earth (4)
PH 564 Scientific Computing II (3)
PPOL 522 Quantitative Methods for Public Policy Analysis (4)
ST 511, 512, 513 Methods of Data Analysis (4 each)
ST 515 Design and Analysis of Planned Experiments (3)

ST 531 Sampling Methods (3)
ST 543 Applied Stochastic Models (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. These courses are intended to broaden the Program of Study by acquainting the student with subject matter in areas of environmental science to which quantitative analysis may be applied. The courses are to be selected from the **Methods and Numerical Skills** list above. A single course may not be used to satisfy both the Science Focal Area requirement and the Methods and Numerical Skills requirement.

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

ELECTIVE COURSES

11 Cr maximum for the M.S. and M.A. degrees and **26 Cr maximum** for the Ph.D. degree. Students will work with their graduate advisor and committee to select elective 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

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