ENVIRONMENTAL SCIENCES
GRADUATE PROGRAM (ESGP)
AREA OF CONCENTRATION IN
WATER RESOURCES

PURPOSE

The Area of Concentration in Water Resources is designed for students who have a strong natural science, policy, or management background and want to develop an understanding of water resources in relation to environmental issues. Water Resources is the study of spatial and temporal variations and movement of water within and between earth systems. and the physical, chemical, biological, and social processes that affect and accompany the movement of water. Within the Water Resources track, students may choose to focus on integrated aspects of aquatic, terrestrial, atmospheric, marine and social systems.

PROGRAM OF STUDY

Course work is divided into 5 categories, including ESGP Core courses, Methods and Numerical Skills courses, Ecology courses, Elective courses, and Thesis or Project. Total credits required are a minimum of 45 Cr for the M.S. and M.A. degree and 108 Cr for the Ph. D. degree. Typical Programs of Study will include minimum credits as follow:

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. 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

BOT 570 Community Structure and Analysis (4)
ENSC 511 Global Environmental Change: Using Data to Inform Decisions (3)
BEE 512 Physical Hydrology
BEE 529 Biosystems Modeling Techniques (3)
CE 513 GIS in Water Resources (3)
GEOG 552 Environmental Assessment (3)
GEOG 560, 561, 562 GISCIENCE I, II, III: Geographic Information Science (4)
GEOG 565 Spatio-Temporal Variation in Ecology and Earth Science (4)
GEOG 580 Remote Sensing I: Principles and Applications (4)
GEOG 581 Satellite Image Analysis (4)
IB 592 Theoretical Ecology (4)
OC 512 Basic MATLAB for Environmental Scientists and Engineers (2)
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 531 Sampling Methods (3)

SCIENCE FOCAL AREA COURSES

15 Cr for M. S, and M.A. degree and 30 Cr for Ph.D. degree. Focal area courses are intended to develop depth of student understanding in water resources and related disciplines. The courses below are examples of 3 possible areas of focus that fall within water resources. The program of study is intended to be flexible to accommodate other areas of study, so that students may tailor their program to match their specific area of interest. Other examples of possible focal areas include Riparian Restoration, International Water Resources, Watershed Analysis, Remote Sensing Hydrology, and Vegetation-Atmosphere Interactions.

The following is a partial listing of currently available classes that would fulfill the requirements for students enrolled in the Area of Concentration in Water Resources. The list presented here is by no means a complete catalog of courses available in the track. The thesis advisor and graduate committee will assist the student in identifying other courses mat will be considered within the theme areas and will count towards the credits needed to satisfy Water Resources Course requirements. Additional online courses may be included in the program of study that are not listed below.

A. Hydrology Courses

BEE 512 Physical Hydrology (3)
BEE 549 Regional Hydrologic Modeling (3)
CE 512 Hydrology (4)
CE 514 Groundwater Hydraulics (4)
FE 536 Forest Disturbance Hydrology (3)
GEOG 523 Snow Hydrology (3)
GEOG 524 Hydrology for Water Resources Management (3)
GEOG 577 Glaciers in the Climate System (3)
OC 630 Ocean Wave Mechanics I (3)
OC 670 Fluid Dynamics (4)
RNG 555 Riparian Ecohydrology and Management (4)
WRS 536 Fundamentals of Hydrology (3)

B. Water Quality and Land Use Courses

BEE 545 Sediment Transport (4)
BEE 546 River Engineering (4)
BEE 568 Bioremediation Engineering (3)
CE 515 Coastal Infrastructure (3)
CE 516 Stormwater Design and Management (4)
ENVE 521 Drinking Water Treatment Processes (4)
ENVE 522 Wastewater Treatment Processes (4)
ENVE 531 Fate and Transport of Chemicals in Environmental Systems (4)
ENVE 532 Aquatic Chemistry: Natural and Engineered Systems (4)
ENVE 535 Physical and Chemical Treatment Processes (4)
ENVE 536 Aqueous Environmental Chemistry Laboratory (1)
ENVE 541 Microbial Processes in Environmental Systems (4)
ENVE 554 Groundwater Remediation (4)
ENVE 556 Sustainable Water Resources Development (3)
FE 545 Sediment Transport (4)
FES 545 Ecological Restoration (4)
FW 554 Fishery Biology (4)
FW 556 Freshwater Ecology and Conservation (5)

FW 564 Marine Conservation Biology (3)
FW 573 Fish Ecology and Conservation (4)
FW 564 Marine Conservation Biology (3)
FW 580 Stream Ecology (3)
GEOG 595 Field Geography of Oregon II (3)
GEOG 596 Field Research in Geomorphology and Landscape Ecology (3)
OC 523 Ocean Ecological Dynamics (4)
OC 533 Coastal and Estuarine Oceanography (3)
OC 534 Estuarine Ecology (4)
RNG 555 Riparian Ecology and Management (3)
SOIL 525 Mineral-Organic Matter Interactions (3)
SOIL 545 Environmental Soil Chemistry (3)

C. Policy and Management Courses

GEOG 540 Conflict, Cooperation, and Control in the United States (3)
GEOG 541 The World's Water (3)
H 540 Water and Human Health (3)
WRP 521 Water Conflict Management and Transformation (3)
WRP 524 Sociotechnological Aspects of Water Resources (3)

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 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

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