ENVIRONMENTAL SCIENCES GRADUATE
PROGRAM AREA OF CONCENTRATION IN
NATURAL RESOURCES

PURPOSE
Natural Resources is the scientific discipline that concerns the relationship between natural and managed population systems, human systems and the environment they all share. The Area of Concentration in Natural Resources is developed to integrate the sciences of biology, ecology and management with the study of human systems: sociology, economics, policy, ethics and communication. Program goals are to stimulate multidisciplinary research among the disciplines, and to promote responsible application of information toward resolution of natural resource problems. These relationships include studies at the species, sub-species, biological and human community, and ecosystem levels of scale. It also includes interactions of organisms and the human systems of production and economics, as well as the consequences of use.

The Natural Resources track is intended for students with strong natural sciences, management, or social sciences backgrounds and who wish to integrate their study to inform natural resource/environmental problems. Students must have the necessary course work in biology, statistics, social science, physical science, and mathematics to enroll in graduate courses that constitute the Area of Concentration in Natural Resources.

PROGRAM OF STUDY
Course work is divided into five categories, including ES Core courses, Methods and Numerical Skills, and courses in each of two other categories (1) Biology, Ecology and Management, (2) Sociology, Economics, Policy, and Ethics and Communication. Students must complete courses from each of the two categories, and elective courses (Ph.D. only) to provide either breadth or depth to each student's chosen area of focus.

A thesis is required for M.S. and Ph.D. degrees. The thesis should integrate across three of the four categories. Total course units required are a minimum of 45 credits for the M.S. degree and 108 credits for the Ph.D. degree. A student's graduate advisory committee will consist of a graduate representative and representatives from disciplines in three of the four emphasis areas. A student's major professor will usually be from a discipline in the primary focus area.

Typical Programs of Study will include the following minimum credits:

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>M.S. &amp; M.A. Degrees</th>
<th>Ph.D. Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES Core Courses</td>
<td>9-12 Cr</td>
<td>10-12 Cr</td>
</tr>
<tr>
<td>Methods and Numerical Skills</td>
<td>6 Cr</td>
<td>9 Cr</td>
</tr>
<tr>
<td>Ecology Courses</td>
<td>15 Cr</td>
<td>30 Cr</td>
</tr>
<tr>
<td>Electives</td>
<td>3-9 Cr</td>
<td>3-23 Cr</td>
</tr>
<tr>
<td>Thesis</td>
<td>6-12 Cr</td>
<td>36-56 Cr</td>
</tr>
<tr>
<td>Total</td>
<td>45 Cr</td>
<td>108 Cr</td>
</tr>
</tbody>
</table>

ES CORE COURSES

- ENSC 515 Environmental Perspectives and Methods (3)
- ENSC 520 Environmental Analysis (3)
- ENSC 508 Workshop (2)
- GRAD 520 Responsible Conduct of Research (1)

METHODS AND NUMERICAL SKILLS

- BI 570 Community Structure and Analysis (4)
- CROP 590 Experimental Design in Agriculture (4)
FES 523 Quantitative Analysis in Social Science (4)
SOIL 555 Biology of Soil Ecosystems (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)

EMPHASIS AREA I: BIOLOGY, ECOLOGY AND MANAGEMENT

BOT 542 Plant Population Ecology (3)
BOT 543 Plant Community Ecology (3)
BOT 588 Environmental Physiology of Plants (3)
BOT 668 Plant Disease Dynamics (4)
ENT 520 Insect Ecology (3)
FES 544 Ecological Aspects of Park Management (3)
FES 548 Invasive Plant: Biology, Ecology, and Management (3)
FOR 536 Wildland Fire Science and Management (4)
FOR 543 Silvicultural Practices (5)
FW 551 Avian Conservation & Management (3)
FW 558 Mammal Conservation and Management (4)
FW 571 Environmental Physiology of Fishes (4)
FW 573 Fish Ecology and Conservation (4)
FW 580 Stream Ecology (3)
FW 586 Genetics and Demography of Small Populations (3)
MB 548 Microbial Ecology (3)
OC 646 Physical/Biological Interactions in the Upper Oceans (4)
OC 647 Marine Microbial Processes (4)
RNG 521 Wildland Restoration & Ecology (4)
RNG 555 Riparian Ecology and Management (3)
RNG 662 Rangeland Ecology (3)
SOIL 535 Soil Physics (3)
SOIL 555 Biology of Soil Ecosystems (4)
Z 523 Environmental Physiology (3)

EMPHASIS AREA II: SOCIOLOGY, ECONOMICS, POLICY, ETHICS AND COMMUNICATION

AEC 532 Environmental Law (4)
AEC 534 Environmental and Resource Economics (3)
AEC 550 Environmental and Natural Resource Economics (4)
AEC 551 Applications of Environmental and Natural Resource Economics (4)
ANTH 577 Ecological Anthropology (4)
ANTH 581 Natural Resources and Community Values (4)
COMM 524 Communication in Organizations: Theories and Issues (3)
COMM 540 Theories of Conflict and Conflict Management (3)
COMM 542 Bargaining and Negotiation Processes (3)
COMM 544 Third Parties in Dispute Resolution: Mediation/Arbitration (3)
FES 593 Environmental Interpretation (4)
FOR 562 Natural Resource Policy and Law (3)
PHL 540 Environmental Ethics (3)
PHL 543 World Views and Environmental Values (3)
PS 575 Environmental Politics and Policy (4)
SOC 580 Environmental Sociology (4)
SOC 581 Society and Natural Resources (4)
SOC 585 Consensus and Natural Resources (3)
ELECTIVE COURSES
Students will work with their graduate advisor and committee to select elective courses from Emphasis areas I and II to develop necessary background to add either breadth or depth to a student's Program of Study. Other courses also may be included if believed to be appropriate by a student's guidance committee.

THESIS
6-12 credits for M.S. and 36-50 for Ph.D. degree. For the M.A. degree, 3 credits are required for the program project. Other appropriate courses will be selected to satisfy the 45 total unit requirement for the M.A. degree.