Science of Natural and Environmental Systems (SNES)
Requirements for the Major
http://snes.eas.cornell.edu

Note: Please be aware that many upper level courses have pre-requisites and some courses are only offered alternate years. Courses designed for non-science majors will not fulfill a requirement. If you are not sure, please check with your advisor.

Foundation  **The following courses are required.**

Biology - 2 semesters  Biology 1101 – 1110 (inclusive)
Calculus - 2 semesters  Math 1110/1120, or 1910/1920
Chemistry and Physics - 4 semesters (at least 1 semester of each);
Chemistry 1560 (formerly 206)/2070 or 2080 (as a prereq for CSS 3650), 2090
Chemistry 2150/2160, 1570 (formerly 257)
Physics 1101/1102, 2207/2208 (prereq is Math 1120), 1112, 2213/2214 (prereq is Math 1190)
Physics 1103 (next offered 2009-2010), or Physics 1116
Statistics - 1 semester  AEM 2100 (S), ILRST 2100 (S), Math 1710 (F/S), NtRes 3130 (F), or PAM 2100 (F)
DEA 1500 - Introduction to Human-Environment Relationships
(special discussion section for "Writing in the major")
( Spring)
NTRES/SNES 1101 - Intro to the Science and Management of Environmental and Natural Resources
(required for Freshman only)
(Fall)
NTRES 2010 - Environmental Conservation
(Spring)

Environmental Core  **The following courses are required.**

Biotic Systems  BIOEE 2610 Ecology and the Environment  (Fall)
Capstone Course  ALS 4770 Environmental Stewardship (recommended SR year)  (Spring)
Colloquium Series  SNES 2000 Environmental Sciences Colloquium
(required twice, recommended SO & SR years)  (Fall)
Earth Systems  CSS 3650 Environmental Chemistry: Soil, Air and Water  (Spring)
Economic Systems  AEM 2500 Environmental and Resource Economics  (Fall)
Social Systems  DSOC 3240 Environment and Society  (Spring)

Concentrations  **Choose one of five concentrations.**

I. Environmental Agriculture
II. Environmental Biology
III. Environmental Economics
IV. Environmental Information Science
V. Sustainable Development

I.  **Environmental Agriculture**
The goal of this concentration is to provide students with a solid background in agriculture, to convey in-depth knowledge of environmental impact of agriculture including biotechnology, and to introduce approaches to mitigation of soil and water pollution and environmental degradation.

Choose one course from each group with at least two courses containing experimental work (*).

**Group 1: Systems Course**

ANSC/CSS 4120 Whole-Farm Nutrient Management  (Spring)
BIOEE 4730 Ecology of Agricultural Systems  (Fall)
CSS/IARD 4140 Tropical Cropping Systems: Biodiversity, Social, and Environmental Impacts  (Fall)
HORT 4600 Cropping Systems Ecology (*)  (Spring)
NTRES 4800 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World  (Spring)
### II. Environmental Biology

The goal of this concentration is to provide students with a sound scientific understanding about plants, animals and microorganisms in their natural environments. Students take six courses to complete the concentration.

#### Group 1: Foundations in Biology  
Choose two courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
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<tbody>
<tr>
<td>BIOBM 3300</td>
<td>Principles of Biochemistry, Individual Instruction</td>
<td>Fall and Spring</td>
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<tr>
<td>BIOBM 3330</td>
<td>Principles of Biochemistry: Proteins, Metabolism,</td>
<td>Summer</td>
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<td></td>
<td>Molecular Biology</td>
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<td>or</td>
<td>the sequence BIOBM 3310/BIOBM 3320</td>
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<tr>
<td></td>
<td>Principles of Biochemistry: Proteins and Metabolism</td>
<td>Fall</td>
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<tr>
<td>諶EVOE 2780</td>
<td>Evolutionary Biology</td>
<td>Fall or Spring</td>
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<tr>
<td>or</td>
<td>BIOPL 4480 Plant Evolution &amp; the Fossil Record</td>
<td>Spring</td>
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<td>Genetics</td>
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<tr>
<td>BIOGD 2810</td>
<td>Genetics</td>
<td>Fall &amp; Spring</td>
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<tr>
<td>or</td>
<td>ENTOM 4700 Ecological Genetics</td>
<td>Spring</td>
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<tr>
<td>or</td>
<td>NTRES 2830 Genetics</td>
<td>Fall</td>
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#### Group 2: The Physical and Biological Environment  
Choose two courses.

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<tr>
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<th>Term</th>
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<tbody>
<tr>
<td>BEE 3710</td>
<td>Hydrology and the Environment</td>
<td>Spring</td>
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<tr>
<td>BIOEE 4570</td>
<td>Limnology: Ecology of Lakes</td>
<td>Spring</td>
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<tr>
<td>BIOEE 4580</td>
<td>Community Ecology</td>
<td>Spring</td>
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<tr>
<td>BIOEE 4620</td>
<td>Marine Ecology</td>
<td>Fall</td>
</tr>
<tr>
<td>BIOEE 4780</td>
<td>Ecosystem Biology</td>
<td>Spring</td>
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<tr>
<td>BIOSM 3090</td>
<td>Coastal Ecology &amp; Bioclimates</td>
<td>Summer</td>
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<tr>
<td>BIOSM 3750</td>
<td>Field Marine Biology and Ecology</td>
<td>Summer</td>
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<tr>
<td>CSS 4660</td>
<td>Soil Ecology</td>
<td>Spring</td>
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<tr>
<td>CSS/EAS 4830</td>
<td>Environmental Biophysics (4)</td>
<td>Fall</td>
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</tbody>
</table>
EAS/BIOEE 3500 Dynamics of Marine Ecosystems (Fall)
NTRES 3220 Global Ecology and Management (Spring)
NTRES/BIOEE 4560 Stream Ecology (Fall)

Group 3: Plants, Animals, Microbes and the Environment
Choose two courses.

BIOEE 4660 Physiological Plant Ecology, Lectures (Spring)
BIOEE 4700/4720 Herpetology Lectures/Laboratory (Spring)
BIOEE 4750 Ornithology (Spring)
BIOEE 4760 Biology of Fishes (Fall)
BIOMI 2900 General Microbiology (Fall & Spring)
BIOMI/CSS 3970 Environmental Microbiology (Spring)
BIOMI 4180 Microbial Ecology (Spring)
BIOSM 3080 Field Microbial Ecology (Summer)
CSS 3150 Weed Biology and Management (Fall)
ENTOM 2120 Insect Biology (Fall)
ENTOM 3440 Insect Conservation Biology (Spring)
ENTOM 3700 Pesticides, the Environment and Human Health (Fall)
ENTOM/BIOEE 4550 Insect Ecology (Fall)
HORT 4400 Restoration Ecology (Fall)
HORT 4600 Cropping Systems Ecology (formerly Plant-Plant Interactions)
NTRES 3110 Fish Ecology, Conservation and Management (Spring)
NTRES 3140 Conservation of Birds (Summer)
NTRES 4100 Conservation Biology (Fall)
NTRES 4110 Quantitative Ecology and Management of Fisheries Resources (Spring)
NTRES 4120 Wildlife Population Analysis (Spring)
NTRES 4200 Forest Ecology (Fall)
NTRES 4220 Wetland Ecology and Management (Fall)
PLPA 3010 Biology and Management of Plant Diseases (Fall)
PLPA 3090 Fungi (Fall)

III. Environmental Economics
The goal of this concentration is to provide students with a solid background in economic theory and to show them how important static and dynamic allocation problems arise when managing natural resources and environmental quality.

Required.
AEM 4500 Resource Economics (Fall)
AEM 4510 Environmental Economics (Spring)
ECON 1110 Introductory Microeconomics (Fall, Spring, Winter & Summer)
ECON 1120 Introductory Macroeconomics (Fall, Spring, Winter & Summer)
ECON 3130 Intermediate Microeconomic Theory (Fall, Spring, & Summer)
ECON 3140 Intermediate Macroeconomic Theory (Fall, Spring, & Summer)

Choose one course.
AEM 4110 Introduction to Econometrics (Fall)
AEM 4120 Computational Methods for Management and Economics (Spring)
BEE 4750 Environmental Systems Analysis (Fall)
CRP/NTRES 4440 Resource Management and Environmental Law (Spring)
IV. Environmental Information Science
The goal of this concentration is to provide students with a critical understanding of the collection and use of environmental information, as well as to support students in developing skills necessary to acquire, process, and analyze environmental information.

Information Acquisition

Group 1: Remote Information Acquisition  Choose one course.
CSS/CEE  4110  Resource Inventory Methods       (Spring)
CSS 6600/CEE 6100  Remote Sensing Fundamentals    (Fall)

Group 2: Ground-based Information Acquisition  Choose two courses.
BEE  4270  Water Sampling and Measurement        (Fall)
BIOEE  2630  Field Ecology                        (Fall)
BIOEE  4560  Stream Ecology                      (Fall)
COMM  2820  Research Methods in Communication Studies (Fall)
DSOC  3130  Social Indicators and Research       (Fall)
EAS  3010  Evolution of the Earth System          (Fall)
EAS  4170  Field Mapping in Argentina             (Summer)
EAS  4370  Geophysical Field Methods              (Fall)
NTRES  4200/4201  Forest Ecology                 (Fall)
NTRES  4220/4221  Wetland Ecology and Management (Fall)

Information Processing  Choose one course.
CEE  6150  Digital Image Processing               (Spring)
CRP  4080  Introduction to GIS                    (Spring)
CSS  4200  Geographic Information Systems         (Fall)
CSS  6200  Spatial Modeling and Analysis          (Spring)

Information Analysis  Choose one course.
BEE  4750  Environmental Systems Analysis        (Fall)
BIOEE  3620  Dynamic Models in Biology            (Spring)
NTRES  3100  Applied Population Ecology           (Spring)
NTRES  4110  Quantitative Ecology and Management of Fisheries Resources (Spring)
NTRES  4120  Wildlife Population Analysis: Techniques and Models (Spring)
NTRES  4240  Landscape Impact Analysis            (Spring)

V. Sustainable Development
The goal of this concentration is to provide students with a solid background in the issues that need to be considered for sustainable development, and to specifically recognize the need to do a critical analysis of all of the factors involved, rather than assume that the “obvious” is obvious.

Required.
BEE  3299  Sustainable Development: A Web-Based Course   (Spring & Summer)
NBA  5730  Seminar in Sustainable Development     (Spring)

Economics, Decision-Making and Equity  Choose two courses.
AEM  4510  Environmental Economics                 (Spring)
BEE 4900/AEM 6900  Biofuels: The Economic and Environmental Interactions (Spring)
DSOC  4380  Population and Development               (Spring)
NTRES  4310  Environmental Strategies                (Spring)
NTRES  4440  Resource Management and Environmental Law (Spring)

Technologies for Sustainable Development  Choose two courses.
BEE  4800  Introduction to Atmospheric Chemistry      (Spring)
BEE  4010  Renewable Energy Systems                   (Spring)
BEE  4750  Environmental Systems Analysis            (Fall)
BEE  4870  Sustainable Energy Systems                  (Fall)
CRP  3780  Recycling and Resource Management           (Spring)
CRP  3840  Green Cities                                 (Fall)
DEA  4220  Ecological Literacy and Design              (Spring)