

C o u r s e s o n t h e  
**ENVIRONMENT**

*A Student Guide to University of Minnesota  
Courses on Environmental Issues on the Twin Cities Campus*



1996-1999

**CURA RESOURCE COLLECTION**

Center for Urban and Regional Affairs  
University of Minnesota  
330 Humphrey Center

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**ENVIRONMENT**

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# GENERAL INFORMATION

## PURPOSE AND SCOPE OF THE COURSE GUIDE

*Courses on the Environment: A Student Guide to University of Minnesota Courses on Environmental Issues on the Twin Cities Campus, 1996–1999* is a supplemental guide to official University bulletins of the various colleges, schools, and institutes of the University of Minnesota. It is designed to help students locate courses which address topics relevant to various issues on the environment. The guide serves as an index to 523 environmental courses offered by 54 different departments on the Twin Cities campus by providing listings of the courses by both subject area and by department. The number of courses has grown from 477 courses in the 1994–1995 guide, 440 in 1993–1994, and 358 in 1992–1993. CURA started its tradition of publishing these guides in 1971 when 280 courses were listed.

We are pleased that the College of Natural Resources has joined with CURA in sponsoring this 1996–1999 guide. Their contributions are twofold—assistance for production costs for the printed version and maintenance of the new Web site for the electronic version of the guide. CURA is most grateful for this support from the College of Natural Resources.

The form of this 1996–1999 guide differs from its predecessors because it points the reader to other sources for detailed course descriptions. It will be the last environmental guide issued before the University of Minnesota changes from a quarter system to a semester system in Fall, 1999.

Other opportunities to examine environmental issues include departmental seminars and lectures that are presented throughout the academic year. At the current time (Fall, 1996) CURA is compiling weekly announcements of these events in an environmental events calendar. It is available at the Web site <http://www.umn.edu/cura/environ.htm> and also by e-mail. Send a message to [envcalen@umn.edu](mailto:envcalen@umn.edu) for information.

## PRINTED AND ELECTRONIC VERSIONS OF THE 1996–1999 GUIDE

### Printed Version

There are now printed and electronic formats for *Courses on the Environment*, both published in an abbreviated version listing only titles of courses. To find course descriptions and information on credits and prerequisites in a print format, consult the University bulletins for the various colleges. The bulletins are available to students

at 240 Williamson Hall on the Minneapolis campus and at the Office of the Registrar in 130 Coffey Hall on the St. Paul campus. Students may request that bulletins be mailed to them by calling the Office of Admissions at 625-2008. Faculty may request copies by calling 626-1785.

The Office of the Registrar publishes two other relevant publications for each quarter of classes. They are the *Course Guide*, which provides course descriptions, work load, grading, and exam information supplied by the instructor for 1xxx, 3xxx, and 5xxx level courses, and the *Twin Cities Campus Class Schedule*. Both of these publications are available at all University bookstores.

### Electronic Version

Course descriptions and credit and prerequisite information can also be found by going to <http://www.cnr.umn.edu/envcourses> for the Web version of *Courses on the Environment*. As full electronic college bulletins are posted on the Web in coming months, links will be added from the course titles in the environmental guide to the course descriptions given in the new college bulletins.

Until late in 1996, when several new college bulletins will be available on the Web, course descriptions and information on credits and prerequisites are available at <http://www.umn.edu/commpub/bulletins.html> in Gopher versions of old college bulletins.

Web sites that provide students with information on courses continue to become available. The print publications of the Office of the Registrar, the *Course Guide* and *Class Schedule*, are also available at the Web site <http://www.umn.edu/registrar/OTRREGISTRATION.HTM>. A new “Student Services” Web site at <http://stage.student.umn.edu/students> provides links to a variety of useful sources, including an index to degree programs and links to home pages of University departments and colleges.

## ORGANIZATION OF THE GUIDE

### I. Courses Listed by Subject Area

Environment theme courses appear first in this section, followed by listings of courses in 24 broad subject areas arranged alphabetically. This subject index is designed to help students who wish to pursue an interdisciplinary area of environmental study and want to find courses of interest in various departments. While some courses are obviously found in a certain department, the difficulty in finding all the courses

## 2 General Information

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which pertain to a particular topic when they are offered by so many different departments and listed in so many different University bulletins can be eased by consulting this subject index.

### II. Courses Listed by Department

This section lists the environmental courses offered by a given department and is useful to those pursuing an environmental studies emphasis within a specific departmental major or minor. Each department's listing starts with contact information for persons prepared to advise students desiring more information, followed by a list of the environmentally-related course titles offered by the department. Note that in this new abbreviated version, only course titles are listed. To obtain course descriptions and information on credits and prerequisites, follow the instructions given on page 1 under "Printed Version," and "Electronic Version" and in the footnote at the bottom of the pages listing course titles.

### III. Special Academic Programs

In this section of the guide, information is given on a variety of interdisciplinary programs and alternative ways of earning credit.

#### *Formal Interdisciplinary Programs*

These programs focus on a broad range of environmental issues and are offered by several colleges, schools, and institutes. They generally require a combination of courses from different fields of instruction and are offered for majors, minors, and concentrations for bachelor's, master's, and doctoral degrees. Information given for each program includes its name, location, and the name of a faculty contact person. A new certificate program is also listed.

#### *Alternative Ways to Earn Academic Credit*

Optional ways to earn credit through special programs in Extension Classes, Independent Study, Global Campus, and UROP are listed in this section of the guide.

#### *Individualized Programs*

In addition to standard departmental majors, there are programs in which students can design their own environmental studies major. These are listed on page 34 under "Individualized Programs."

### IV. Centers

Many centers at the University of Minnesota participate in environmentally-related activities, and their names along with address and contact information are listed here. The activities of the centers often include research in which interested students and faculty members might become involved. In some cases students may obtain credit for work completed in the activities of the centers.

*To request a copy of this course guide, please call CURA at 625-1551 or CNR at 624-6768. We welcome suggestions and comments about the course guide. If some departments, courses, academic programs or centers have been missed, we ask that you bring them to our attention.*



# I. COURSES LISTED BY SUBJECT AREA

## ENVIRONMENT DESIGNATED THEME

### Animal and Plant Systems (AnPl)

3010. Environment and World Food Production.

### Anthropology (Anth)

1101. Human Origins.

1101H. Human Origins.

3116. Ecological Anthropology.

5117. Natural Resources Anthropology.

### Applied Economics (ApEc)

3610. Resource Development and Environmental Economics.

5650. Economics of Natural Resource and Environmental Policy.

### Astronomy (Ast)

1019. Our Changing Planet.

1021H. Introduction to Astronomy.

1031. Exploring the Universe: A.

1032. Exploring the Universe: L.

### Biochemistry (BioC)

5301. Ecological Biochemistry.

### Biology (Biol)

1051/3051. Environmental Studies.

### Chemistry (Chem)

1003. Physical World, Chemistry.

1008. Physical World, Chemistry.

1051-1052. Chemical Principles I-II.

1051H-1052H. Honors Chemical Principles I-II.

### Ecology, Evolution, and Behavior (EEB)

1019. Our Changing Planet.

3001. Introduction to Ecology.

### Entomology (Ent)

1005. Economic Entomology.

5320. Ecology of Agriculture.

### Fisheries and Wildlife (FW)

1002. Wildlife: Ecology, Values and Human Impact.

3052. Introduction to Fisheries and Wildlife Conservation.

5604. Fisheries Ecology and Management.

### Forest Resources (FR)

3103. Meteorology and Climatology for Resource Managers.

3104. Forest Ecology.

3250. Role of Renewable Natural Resources in Developing Countries.

5104. Forest Ecology.

5114. Forest Hydrology and Watershed Management.

5231. Range Management.

5232. Management of Recreational Lands.

5250. Role of Renewable Natural Resources in Developing Countries.

### General College (GC)

1112. Ecological Evaluation of Environmental Problems.

### Geography (Geog)

1402. Geography and Environmental Systems.

### Geology (Geo)

1001. The Dynamic Earth: An Introduction to Geology.

1012. Planet Earth.

1019. Our Changing Planet.

### History of Medicine (HMed)

3040. Human Disease and the Environment in History.

### Microbiology (MicB)

5611. Microbial Ecology.

### Natural Resources and Environmental Studies (NRES)

1040. Natural Resources as Raw Materials.

1201. Conservation of Natural Resources.

3020. Plant Resource Management and the Environment.

3060/5060. Water Quality in Natural Resource Management.

3070. From Local to Global Ecology.

5020. Plant Resource Management and the Environment.

5100. Problem Solving in Natural Resources and Environmental Studies.

## 4 Agriculture

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### Plant Pathology (PIPa)

- 3004. Air Pollution, People and Plants.

### Science in Agriculture (ScAg)

- 1500. Biotechnology: Basic Concepts and Applications.

### Soil, Water, and Climate (Soil)

- 1020. The Soil Resource.
- 5605. Microbial Ecology.

## AGRICULTURE

### Agricultural Engineering Technology (AgET)

- 5027. Appropriate Technology for International Development.
- 5450. Environmental Impacts of Food Production.

### Agronomy and Plant Genetics (Agro)

- 1007. Biology of Food Systems and the Environment.
- 1010. Principles of Agronomy.
- 3020/5120. Growth and Development of Field Crops.
- 3030/5130. Harvest, Storage and Utilization of Field Crops.
- 5020. Introduction to Plant Breeding.
- 5030. Weed Control.
- 5050. Management Technologies for Crop Production in Minnesota.
- 5200. World Food Problems.
- 5310. Orientation to Field Crop Breeding.
- 5320. Orientation to Agronomy and Soils Field Research.

### Animal and Plant Systems (AnPI)

- 3010. Environment and World Food Production.
- 5060. Integrated Management of Cropping Systems.

### Applied Economics (ApEc)

- 5710. U.S. Agriculture: Farm, Food and Environmental Policy.
- 5730. European Agriculture: Farm, Food and Environmental Policy.

### Biosystems and Agricultural Engineering (BAE)

- 3052. Engineering Principles of Soil-Water-Plant Systems.
- 5560. Mechanics of Flow in the Unsaturated Zone.

### Entomology (Ent)

- 1005. Economic Entomology.
- 5210. Insect Pest Management.
- 5280. Livestock Entomology.
- 5320. Ecology of Agriculture.

### Horticultural Science (Hort)

- 5001. Harvest to Market of Horticultural Crops.
- 5034. Commercial Vegetable Agriculture.
- 8023. Evolution of Crop Plants.

### Natural Resources and Environmental Studies (NRES)

- 3020. Plant Resource Management and the Environment.
- 5020. Plant Resource Management and the Environment.

### Plant Pathology (PIPa)

- 3001. Management and Control of Field Crop Diseases.
- 5201. Biology of Plant Diseases.

### Rhetoric (Rhet)

- 3375. Humanities: Agricultural Heritage.

### Science in Agriculture (SAgr)

- 8010. Colloquium in Sustainable Agriculture.

## CLIMATOLOGY AND METEOROLOGY

### Astronomy (Ast)

- 1019. Our Changing Planet.
- 1021H. Introduction to Astronomy.
- 1031. Exploring the Universe: A.
- 1032. Exploring the Universe: L.

### Chemistry (Chem)

- 1051-1052. Chemical Principles I-II.
- 1051H-1052H. Honors Chemical Principles I-II.

### Ecology, Evolution, and Behavior (EEB)

- 1019. Our Changing Planet.

### Forest Resources (FR)

- 3103. Meteorology and Climatology for Resource Managers.

### General College (GC)

- 1111. Science in Context: Weather and Climate.

### Geography (Geog)

- 1425. Introduction to Meteorology.
- 3421. Climatology.
- 5423. Climate Models and Modeling.
- 5424. Applied Climatology.
- 5426. Climate Variations.
- 5441. Quaternary Landscape Evolution.

- 5565. Geographical Analysis of Environmental Systems and Global Change.
- 8420. Seminar: Climatology.

**Geology (Geo)**

- 1019. Our Changing Planet.
- 3002. Climate Change and Human History.
- 3007. Planets of the Solar System.
- 8262. Quaternary Paleoecology and Climate.

**Physics (Phys)**

- 5461. Physics and Chemistry of the Earth's Upper Atmosphere.

**Plant Pathology (PIPa)**

- 3004. Air Pollution, People and Plants.

**Soil, Water, and Climate (Soil)**

- 1425. Introduction to Meteorology.
- 5241. Microclimatology (Soils).
- 5424. Applied Climatology.

**CULTURE, SOCIETY, AND ENVIRONMENTAL PROBLEMS**

**Anthropology (Anth)**

- 1101. Human Origins.
- 1101H. Human Origins.
- 3116. Ecological Anthropology.
- 5117. Natural Resources Anthropology.
- 5960. Senior Seminar: Human/Environment Interactions.

**Architecture (Arch)**

- 1401. The Designed Environment.
- 3501. People, Environment, and Design.
- 5458. Architecture and Culture.
- 5725. Housing and Values.

**Cultural Studies and Comparative Literature (CSCL)**

- 3361. Visions of Nature: The Natural World and Political Thought.
- 3366. Landscape and Ideology, 1600-1875.

**Design, Housing, and Apparel (DHA)**

- 1101. Introduction to the Designed Environment.
- 3463. Environment: Housing and Community.
- 3631. Interior Design Resources and Materials.
- 3633. Lighting Design for Environmental Spaces.
- 5482. The Family and Energy Issues.

**Environmental and Occupational Health (PubH)**

- 5027. Community and Environmental Approaches to Health Behavior Change.

**General College (GC)**

- 1112. Ecological Evaluation of Environmental Problems.

**Geology (Geo)**

- 3004. Human Geomorphology.
- 3006. Water and Society.

**History of Medicine (HMed)**

- 3040. Human Disease and the Environment in History.

**History of Science and Technology (HSci)**

- 3331/5331. Technology in American Culture.
- 5244. History of Ecology and Environmentalism.

**Landscape Architecture (LA)**

- 1401. The Designed Environment.
- 3413. History of Landscape Architecture.
- 5431. History of Landscape Architecture: Individual Influences.
- 8803. The Sublime, the Beautiful, and the Picturesque: Theory and Practice.

**Liberal Studies (LS)**

- 5610. Environmental Ethics, Politics, and Public Policy.

**Natural Resources and Environmental Studies (NRES)**

- 3010. Ethics and Values in Resource Management.
- 3070. From Local to Global Ecology.
- 5800. Natural Resources Interpretation and Communication.

**Philosophy (Phil)**

- 5607. Philosophy of Biology.
- 8620. Seminar: Philosophy of Biology.

**Plant Biology (PBio)**

- 1012. Plants Useful to Humans.

**Plant Pathology (PIPa)**

- 1001. The Good, Bad and Ugly Effects of Microorganisms on Plants and Human Society.
- 3004. Air Pollution, People and Plants.

**Political Science (Pol)**

- 5410. Advanced Topics in Government and Politics: Politics of Environmental Movements.

**Public Affairs (PA)**

- 5892. Strategies for Sustainable Development.

Rhetoric (Rhet)

- 1310. Humanities: The Land in American Experience.
- 3395. In Search of Nature.

Sociology (Soc)

- 3551. World Population Problems.
- 5305. Environmental Sociology.

Soil Science (Soil)

- 5020. Environmental Impact Assessment.
- 5100. Problem Solving for Environmental Science.

Strategic Management and Organization (BGS)

- 3019/H3019. Topics in Business, Government and Society.
- 8019. Topics in Business and Society.

**EARTH SCIENCES**

Astronomy (Ast)

- 1019. Our Changing Planet.
- 1021H. Introduction to Astronomy.
- 1031. Exploring the Universe: A.
- 1032. Exploring the Universe: L.

Ecology, Evolution, and Behavior (EEB)

- 1019. Our Changing Planet.

General College (GC)

- 1171. Physical Geology.
- 1173. Geology of the National Parks.

Geography (Geog)

- 5441. Quaternary Landscape Evolution.

Geology (Geo)

- 1001. The Dynamic Earth: An Introduction to Geology.
- 1004. Physical and Historical Geology of Minnesota.
- 1011. Volcanoes of the Earth.
- 1012. Planet Earth.
- 1019. Our Changing Planet.
- 1021. Introduction to Geology Lab: Geology of Minnesota.
- 1031. Earth System Science from the Perspective of Minnesota Geology.
- 1601. Oceanography.
- 1701. Faces of the Earth.
- 3001. Earth Materials.
- 3003. Geohazards.

- 3005. Earth Resources.

- 3201. Geodynamics I: The Solid Earth.

- 3202. Geodynamics II: The Fluid Earth.

- 3211. Honors Earth Science.

- 3301. Geochemical Principles.

- 3402. Introductory Mineralogy.

- 3402. Petrology.

- 5004. Mineralogy.

- 5108. Advanced Environmental Geology.

- 5201. Structural Geology.

- 5251. Geomorphology.

- 5261. Glacial Geology.

- 5311. General Geochemistry.

- 5313. Aqueous Geochemistry.

- 5641. General and Physical Hydrogeology.

- 8617. Transport Phenomena in Natural Porous Media.

**ECOLOGY**

Agronomy (Agro)

- 1007. Biology of Food Systems and the Environment.

Animal and Plant Systems (AnPl)

- 3010. Environment and World Food Production.

Anthropology (Anth)

- 3116. Ecological Anthropology.

Architecture (Arch)

- 3501. People, Environment, and Design.

Biochemistry (BioC)

- 5301. Ecological Biochemistry.

Biology (Biol)

- 1051/3051. Environmental Studies.

- 1201. Evolutionary and Ecological Perspectives.

- 3008. Ecology and Evolution.

- 5841. Ecology.

Ecology, Evolution, and Behavior (EEB)

- 3001. Introduction to Ecology.

- 3008. Ecology and Evolution.

- 5004. Earth System: Geosphere/Biosphere Interactions.

- 5008. Quaternary Ecology.

- 5014. Ecology of Vegetation.
- 5016. Ecological Plant Geography.
- 5608. Ecosystems: Form and Function.
- 5814. Plant Community Ecology.
- 5817. Vertebrate Ecology.

#### Entomology (Ent)

- 5040. Insect Ecology.
- 5250. Forest Entomology.
- 5320. Ecology of Agriculture.
- 8240. Colloquium in Insect Ecology.

#### Fisheries and Wildlife (FW)

- 1002. Wildlife: Ecology, Values and Human Impact.
- 3054. Biological Conservation: An Ecosystem Approach.
- 5603. Wildlife Habitats and Management.
- 5620. Geographical Information Systems (GIS) for Fisheries, Wildlife, and Biological Conservation.
- 8448. Fishery Science.
- 8452. Conservation Biology: Genetic and Demographic Issues.
- 8459. Stream and River Ecology.
- 8576. Wildlife Management: Large Mammals.

#### Forest Resources (FR)

- 3101. Northern Forest Ecosystems.
- 3104. Forest Ecology.
- 3107. Forest Ecology Laboratory.
- 5104. Forest Ecology.
- 5107. Forest Ecology Laboratory.
- 5108. Physiological Ecology: Organisms to Ecosystems.
- 5142. Tropical Forest Ecology.
- 5146. Dynamics of Global Change: Plant Ecology.
- 5160. Practicum in Forest Biology and Measurements.
- 5215. Forest Fire Ecology and Management.
- 5460. Water Quality: The International Dimension.
- 8104. Research Problems: Forest Ecology.
- 8112. Research Problems: Physiological Ecology.

#### General College (GC)

- 1112. Ecological Evaluation of Environmental Problems.

#### Geography (Geog)

- 5441. Quaternary Landscape Evolution.

#### Geology (Geo)

- 1003. Introduction to the Mesozoic: Evolution, Ecology and Extinction of Dinosaurs.
- 5108. Advanced Environmental Geology.

#### History of Science and Technology (HSci)

- 5244. History of Ecology and Environmentalism.

#### Horticultural Science (Hort)

- 1021. Woody Plant Materials.
- 1022. Herbaceous Plant Materials.
- 3010. Growing Plants Organically: What It Means To Be "Green."
- 5015. Restoration and Reclamation Ecology.
- 5042. Turf Grass Science.

#### International Relations (IntR)

- 3900. Topics in International Relations: The Ecology of Development.

#### Landscape Architecture (LA)

- 5202. Landscape Ecology.
- 5212. Ecological Informants of Design.
- 5222. Planted Form: Ecological Principles/Land Use Concepts and Implementation of Planting Designs.
- 8223. Regional Landscape Design.
- 8804. Landscape Ecology and Design.

#### Microbiology (MicB)

- 5611. Microbial Ecology.

#### Natural Resources and Environmental Studies (NRES)

- 1201. Conservation of Natural Resources.
- 3070. From Local to Global Ecology.
- 3100. Conservation of Biodiversity.
- 5001. Colloquium in Natural Resources and Environmental Studies.
- 3060/5060. Water Quality in Natural Resource Management.
- 5575. Wetlands Conservation.

#### Plant Pathology (PIP)

- 3201. Introductory Plant Systematics.
- 5102. Ecology of Fungi.
- 5206. Biology of Fungi.

#### Soil, Water, and Climate (Soil)

- 5605. Microbial Ecology.

## EDUCATION

### Curriculum and Instruction (CI)

- 5145. Curriculum Topics: Using Como Zoo and Conservatory to Promote Inquiry Teaching.
- 5501. Workshop: Leaves and Trees: Find the Forest in Your Environment.
- 5537. Environmental Education in Sweden: In International Experience.
- 5537. Global Environmental Education.
- 5537. Principles of Environmental Education.
- 5747. Global Environmental Education: Content and Practice.

### Forest Resources (FR)

- 5403. Fundamentals of Natural Resource Education.

### Horticultural Science (Hort)

- 5020. Topics in Plant Science for Teachers.

### Recreation, Park, and Leisure Studies (Rec)

- 5310. Programming Outdoor and Environmental Education.

## ENERGY USE

### Anthropology (Anth)

- 5117. Natural Resources Anthropology.

### Architecture (Arch)

- 5523. Light Frame Buildings: Design for Energy Efficiency, Health, and Durability.
- 5531. Lighting and Acoustic Design.
- 5539. Daylighting and Architectural Design.
- 5541. Thermal Design in Architecture.
- 5542. Building Energy Systems.
- 5543. Climate and Architecture.
- 5725. Housing and Values.

### Civil Engineering (CE)

- 5004. Underground Construction Engineering.

### Design, Housing, and Apparel (DHA)

- 1401. Residential Technology.
- 3633. Lighting Design for Environmental Spaces.
- 5482. The Family and Energy Issues.
- 5634. Interior Design Codes and Environmental Issues.

### Mechanical Engineering (ME)

- 5603. Thermal Environmental Engineering.
- 5604. Heating and Cooling Loads in Buildings.

- 5605. Refrigeration and Air Conditioning Systems.

- 5630. Thermal Environmental Engineering Senior Laboratory.

- 5712. Solar Energy Utilization.

### Natural Resources and Environmental Studies (NRES)

- 1040. Natural Resources as Raw Materials.

### Public Affairs (PA)

- 5711. Energy Policy.

- 5713. Energy Regulation: Analysis and Advocacy.

- 5794. Nuclear Power: Friend or Foe.

- 879x. Workshop/Seminar: Advanced Topics in Technology, Energy, and Environmental Policy.

### Soil Science (Soil)

- 5550. Peatlands: Formation, Classification, and Utilization.

### Strategic Management and Organization (BGS)

- 3003. Business and the Natural Environment.

## ENVIRONMENTAL HEALTH AND POLLUTION CONTROL

### Aerospace Engineering and Mechanics (AEM)

- 5687. Introduction to Acoustics and Environmental Noise.

### Architecture (Arch)

- 5523. Light Frame Buildings: Design for Energy Efficiency, Health, and Durability.

### Biochemistry (BioC)

- 5301. Ecological Biochemistry.

- 5309. Biocatalysis and Biodegradation. (*Same as MicB 5309*)

### Biology (Biol)

- 1051/3051. Environmental Studies.

### Biosystems and Agricultural Engineering (BAE)

- 5745. Ventilating Systems for Indoor Air Quality.

### Chemical Engineering (ChEn)

- 5751. Chemical Engineering in Biotechnology and Environment.

- 5904. Special Topics: Environmental Engineering for Chemical Engineers.

### Chemistry (Chem)

- 1051-1052. Chemical Principles I-II.

- 1051H-1052H. Honors Chemical Principles I-II.

## Civil Engineering (CE)

- 3500. Principles of Environmental Engineering.
- 5099. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as HSem 3030, Mgmt 5101, PA 5793, PubH 5150*)
- 5504. Mass Transport with Environmental Applications.
- 5506. Environmental Water Chemistry.
- 5510. Solid and Hazardous Waste Management.
- 5515. Water and Wastewater Microbiology.
- 5540. Analysis of Groundwater-Soil Pollution Abatement Technology.
- 8507. Environmental Processing of Organic Chemicals.
- 8508. Groundwater Microbiology.
- 8509. Environmental Microbiology.
- 8540. Interfacial Mass Transfer with Environmental Applications.

## Design, Housing, and Apparel (DHA)

- 5634. Interior Design Codes and Environmental Issues.

## Economics (Econ)

- 3611. Environmental Economics.

## Environmental and Occupational Health (PubH)

- 5027. Community and Environmental Approaches to Health Behavior Change.
- 5150. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as CE 5099, Mgmt 5101, PA 5793*)
- 5151. Environmental Health.
- 5152. Environmental Health.
- 5155. Issues in Environmental and Occupational Health.
- 5158. Health Risk Evaluation.
- 5171. Environmental Microbiology.
- 5181. Air Pollution.
- 5184. Measurement of Airborne Contaminants in Workplaces.
- 5186. Environmental Chemistry.
- 5201. Radiation Protection and Measurement.
- 5202. Radiation Laboratory.
- 5211. Survey of Industrial Hygiene.
- 5212. Ventilation Control of Environmental Hazards.
- 5215. Applied Occupational Toxicology.
- 5216. Properties of Workplace Airborne Contaminants.
- 5220. Ventilation Control of Occupational Hazards.
- 5221. Noise in the Workplace.

- 5239. Microbiology of the Human Environment: Seminar.
- 5253. Introduction to Hazardous Waste Management.
- 5261. General Environmental Toxicology.
- 5267. Industrial and Occupational Toxicology.
- 8185. Analysis of Toxicants.
- 8264. Human Diseases Caused by Environmental Agents.

## Environmental Science (ES)

- 1001. Orientation to Environmental Science.
- 1010. Issues in the Environment.
- 3050. Field or Work Experience in Environmental Science.

## Fisheries and Wildlife (FW)

- 5460. Pollution Impacts on Aquatic Systems.

## Forest Resources (FR)

- 5146. Dynamics of Global Change: Plant Ecology.

## History of Medicine (HMed)

- 3040. Human Disease and the Environment in History.

## Honors Seminar (HSem)

- 3030. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as CE 5099, Mgmt 5101, PA 5793, PubH 5150*)

## Horticultural Science (Hort)

- 3010. Growing Plants Organically: What It Means To Be "Green."
- 8045. Plant Response to Environmental Stress.

## Interdepartmental Study (ID)

- 5525-5526. Garbage, Government, and the Globe.

## Law School (Law)

- 5885. Advanced Environmental Law.

## Management (Mgmt)

- 5101. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as CE 5099, HSem 3030, PA 5793, PubH 5150*)

## Mechanical Engineering (ME)

- 5603. Thermal Environmental Engineering.
- 5609. Air Pollution.
- 5610. Air Pollution Control.
- 5616. Aerosol Measurement.
- 5617. Advanced Aerosol Measurement.
- 5620. Clean Room Technology and Particle Monitoring.
- 8613. Fundamentals of Aerosol Behavior.

Plant Pathology (PIP)

- 3004. Air Pollution, People and Plants.

Public Affairs (PA)

- 5793. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as* CE 5099, HSem 3030, Mgmt 5101, PubH 5150)
- 5794. Nuclear Power: Friend or Foe.

Sociology (Soc)

- 5305. Environmental Sociology.

Strategic Management and Organization (BGS)

- 3003. Business and the Natural Environment.

**FISH AND WILDLIFE**

Ecology, Evolution, and Behavior (EEB)

- 5136. Ichthyology.
- 5817. Vertebrate Ecology.
- 5834. Field Ornithology.

Fisheries and Wildlife (FW)

- 1001. Orientation in Fisheries and Wildlife.
- 1002. Wildlife: Ecology, Values and Human Impact.
- 3052. Introduction to Fisheries and Wildlife Conservation.
- 3054. Biological Conservation: An Ecosystem Approach.
- 5129. Mammalogy.
- 5455. Aquaculture.
- 5459. Fish Physiology.
- 5461. The Behavior of Fishes.
- 5570. Avian Conservation.
- 5601. Fisheries Population Analysis.
- 5603. Wildlife Habitats and Management.
- 5604. Fisheries Ecology and Management.
- 5620. Geographical Information Systems (GIS) for Fisheries, Wildlife, and Biological Conservation.
- 8448. Fishery Science.
- 8460. Fish Habitats and Restoration.
- 8576. Wildlife Management: Large Mammals.

Forest Resources (FR)

- 5460. Water Quality: The International Dimension.

General College (GC)

- 1133. Nature Study.

Natural Resources and Environmental Studies (NRES)

- 5001. Colloquium in Natural Resources and Environmental Studies.

**FOREST RESOURCES**

Curriculum and Instruction (CI)

- 5501. Workshop: Leaves and Trees: Find the Forest in Your Environment.

Entomology (Ent)

- 5250. Forest Entomology.

Forest Resources (FR)

- 1001. Forest Resources Orientation.
- 1100. Dendrology.
- 3100. Minnesota Plants.
- 3101. Northern Forest Ecosystems.
- 3104. Forest Ecology.
- 3107. Forest Ecology Laboratory.
- 3201. Forest Measurement Techniques.
- 3225/5225. Directed Study Experience.
- 3500. Arboriculture.
- 5100. Silviculture.
- 5101. Field Silviculture.
- 5102. Forest Wildlife Habitat Management.
- 5104. Forest Ecology.
- 5107. Forest Ecology Laboratory.
- 5108. Physiological Ecology: Organisms to Ecosystems.
- 5114. Forest Hydrology and Watershed Management.
- 5115. Forest Hydrology, Field Applications.
- 5120. Tree Biology.
- 5126. Silviculture: Soil-Site Relationships.
- 5142. Tropical Forest Ecology.
- 5146. Dynamics of Global Change: Plant Ecology.
- 5152. Forest Genetics.
- 5153. Advanced Forest Hydrology.
- 5160. Practicum in Forest Biology and Measurements.
- 5202. Remote Sensing: Field Applications.
- 5215. Forest Fire Ecology and Management.
- 5218. Assessment and Modeling of Forests.
- 5222. Forest Resources Inventory.



- 5236. Forest Recreation Planning.
- 5248. Harvesting and Engineering.
- 5264. Quantitative Techniques in Forest Management.
- 5270. Forest Management and Planning.
- 5460. Water Quality: The International Dimension.
- 5500. Urban Forest Management.
- 5703. Colloquium in Forest Biology.
- 5704. Colloquium in Natural Resources.
- 8100. Research Problems: Silviculture.
- 8101. Research Problems: Forest Tree Physiology.
- 8102. Research Problems: Forest Tree Genetics.
- 8103. Research Problems: Forest Hydrology.
- 8104. Research Problems: Forest Ecology.
- 8106. Topics in Silviculture: Forest Soils.
- 8107. Seminar: Forest Resources.
- 8112. Research Problems: Physiological Ecology.
- 8200. Research Problems: Forest Management.
- 8201. Research Problems: Forest Economics.
- 8202. Research Problems: Forest Biometry.
- 8203. Research Problems: Forest Recreation.
- 8204. Research Problems: Forest Policy.
- 8205. Research Problems: Remote Sensing.
- 8207. Economic Analysis of Forestry Projects.
- 8211. Seminar: Natural Resource Policy Issues.
- 8301. Teaching Practicum.

#### Natural Resources and Environmental Studies (NRES)

- 3020. Plant Resource Management and the Environment.
- 3201. Field Assessment Techniques.
- 5020. Plant Resource Management and the Environment.
- 5703. Agroforestry: Role in Watershed Management.

#### Plant Pathology (PIP)

- 5212. Diseases of Forest and Shade Trees.

#### Soil, Water, and Climate (Soil)

- 5550. Peatlands: Formation, Classification, and Utilization.

### INTERNATIONAL ISSUES/WORLD RESOURCES

#### Agricultural Engineering Technology (AgET)

- 5027. Appropriate Technology for International Development.

#### Agronomy and Plant Genetics (Agro)

- 5200. World Food Problems.

#### Animal and Plant Systems (AnPl)

- 3010. Environment and World Food Production.

#### Anthropology (Anth)

- 5117. Natural Resources Anthropology.

#### Applied Economics (ApEc)

- 5710. U.S. Agriculture: Farm, Food and Environmental Policy.
- 5730. European Agriculture: Farm, Food and Environmental Policy.

#### Curriculum and Instruction (CI)

- 5537. Environmental Education in Sweden: An International Experience.
- 5537. Global Environmental Education.
- 5747. Global Environmental Education: Content and Practice.

#### Ecology, Evolution, and Behavior (EEB)

- 5016. Ecological Plant Geography.
- 5129. Mammalogy.

#### Fisheries and Wildlife (FW)

- 5129. Mammalogy.
- 5455. Aquaculture.

#### Forest Resources (FR)

- 3250. Role of Renewable Natural Resources in Developing Countries.
- 5146. Dynamics of Global Change: Plant Ecology.
- 5250. Role of Renewable Natural Resources in Developing Countries.
- 5460. Water Quality: The International Dimension.
- 8211. Seminar: Natural Resource Policy Issues.

#### General College (GC)

- 1112. Ecological Evaluation of Environmental Problems.

#### Geography (Geog)

- 3421. Climatology.
- 3431. Introduction to Plant and Animal Geography.
- 5565. Geographical Analysis of Environmental Systems and Global Change.

#### Geology (Geo)

- 5108. Advanced Environmental Geology.
- 8262. Quaternary Paleocology and Climate.

#### History of Science and Technology (HSci)

- 5244. History of Ecology and Environmentalism.

#### Horticultural Science (Hort)

- 5034. Commercial Vegetable Agriculture.

Interdepartmental Study (ID)

5525-5526. Garbage, Government, and the Globe.

International Relations (IntR)

3900. Topics in International Relations: Natural Resource and Environmental Policy in the Third World.

3900. Topics in International Relations: Development Assistance Programs.

3900. Topics in International Relations: Environment and Development in the Third World.

3900. Topics in International Relations: The Ecology of Development.

Natural Resources and Environmental Studies (NRES)

1040. Natural Resources as Raw Materials.

3020. Plant Resource Management and the Environment.

3070. From Local to Global Ecology.

5020. Plant Resource Management and the Environment.

3060/5060. Water Quality in Natural Resource Management.

5703. Agroforestry: Role in Watershed Management.

Plant Biology (PBio)

3201. Introductory Plant Systematics.

3004. Air Pollution, People and Plants.

Political Science (Pol)

3872/5872. International Organizations and the Environment.

5410. Advanced Topics in Government and Politics: Politics of Environmental Movements.

Public Affairs (PA)

5731. Technology Policy.

5732. Science, Technology and International Affairs.

5892. Strategies for Sustainable Development.

Sociology (Soc)

3551. World Population Problems.

Soil, Water, and Climate (Soil)

3220. Soil Conservation and Land Use Management.

5550. Peatlands: Formation, Classification, and Utilization.

Strategic Management and Organization (BGS)

3019/H3019. Topics in Business, Government and Society.

8019. Topics in Business and Society.

**LAKE ITASCA FORESTRY AND BIOLOGICAL STATION**

Biology (Biol)

3812. Plant Biology.

5841. Ecology.

5850. Biological, Chemical and Physical Aspects of Lakes.

Ecology, Evolution, and Behavior (EEB)

5814. Plant Community Ecology.

5817. Vertebrate Ecology.

5834. Field Ornithology.

Entomology (Ent)

5360. Aquatic Entomology.

5600. Field Entomology.

5610. Aquatic Entomology.

Forest Resources (FR)

3100. Minnesota Plants.

3101. Northern Forest Ecosystems.

3201. Forest Measurement Techniques.

5160. Practicum in Forest Biology and Measurements.

Landscape Architecture (LA)

3201. Field Assessment Techniques.

Plant Biology (PBio)

5801. Plants and Boreal Flora.

**LAKES AND WETLANDS (See also WATER RESOURCES)**

Biology (Biol)

5850. Biological, Chemical and Physical Aspects of Lakes.

Civil Engineering (CE)

8430. Lake and Reservoir Hydrodynamics.

8551. Seminar: Models of Aquatic Environments.

Ecology, Evolution, and Behavior (EEB)

5601. Limnology.

5608. Ecosystems: Form and Function.

5621. Limnology Laboratory.

Fisheries and Wildlife (FW)

5570. Avian Conservation.

Geology (Geo)

5601. Limnology.

8602. Advanced Limnology.

Plant Biology (PBio)

5231. Introduction to the Algae.

Soil, Water, and Climate (Soil)

5555. Wetland Soils.

**LAND USE****Applied Economics (ApEc)**

- 5600. Land and Water Economics.
- 8360. Land Economics and Policy.

**Architecture (Arch)**

- 1401. The Designed Environment.
- 5711. Design Principles of the Urban Landscape.

**Biology (Biol)**

- 1051/3051. Environmental Studies.

**Forest Resources (FR)**

- 5232. Management of Recreational Lands.
- 5257. Recreation Land Policy.
- 5262. Remote Sensing of Natural Resources.

**Geography (Geog)**

- 1402. Geography and Environmental Systems.
- 3361. Land Use and the Federal Government.
- 3362. Land Use and State Government.
- 5361. Land in America.
- 5601. Introduction to Land Use Planning. (*Same as PA 5601*)
- 8344. Seminar: Public Land Policy in Minnesota.
- 8345. Seminar: Public Land Policy in Minnesota.

**Horticultural Science (Hort)**

- 5026. Landscape Management.

**Landscape Architecture (LA)**

- 1401. The Designed Environment.
- 5202. Landscape Ecology.
- 5211. Making Landscape Space.
- 5212. Ecological Informants of Design.
- 5222. Planted Form: Ecological Principles/Land Use Concepts and Implementation of Planting Designs.
- 5562. Introduction to Geographical Information Systems.
- 5571. Landscape Construction: Landform Systems.
- 5572. Landscape Construction: Spatial Performance.
- 8222. The Landscape Architectural Design of Community Places.
- 8223. Regional Landscape Design.
- 8231. Urban Landscape Design.
- 8232. Design of Recreational Landscapes.
- 8801. Concepts of Landscape Evaluation.

- 8802. Perception Manipulation in Design of Exterior Space.

- 8804. Landscape Ecology and Design.

**Natural Resources and Environmental Science (NRES)**

- 3201. Field Assessment Techniques.
- 5102. GIS for Problem Solving in Environmental Science and Management.
- 5245. Fundamentals of Landscape Planning for Recreation.

**Public Affairs (PA)**

- 5251. Environmental Planning.
- 5601. Land Use. (*Same as Geog 5601*)
- 5622. Managing Urban Growth and Change.

**Recreation, Park, and Leisure Studies (Rec)**

- 5160. Recreation Land Policy.

**Rhetoric (Rhet)**

- 1310. Humanities: The Land in American Experience.

**Soil, Water, and Climate (Soil)**

- 3220. Soil Conservation and Land Use Management.

**LIFE SCIENCES****Biochemistry (BioC)**

- 5309. Biocatalysis and Biodegradation. (*Same as MicB 5309*)

**Biology (Biol)**

- 3008. Ecology and Evolution.
- 5013. Biology of Microorganisms.
- 5841. Ecology.

**Chemistry (Chem)**

- 1003. Physical World, Chemistry.
- 1008. Physical World, Chemistry.
- 1051-1052. Chemical Principles I-II.
- 1051H-1052H. Honors Chemical Principles I-II.

**Ecology, Evolution, and Behavior (EEB)**

- 3001. Introduction to Ecology.
- 5051. Analysis of Populations.
- 5608. Ecosystems: Form and Function.

**Entomology (Ent)**

- 5040. Insect Ecology.
- 5320. Ecology of Agriculture.

## 14 Naturalist Studies

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### Fisheries and Wildlife (FW)

- 5129. Mammalogy.
- 8452. Conservation Biology: Genetic and Demographic Issues.
- 8576. Wildlife Management: Large Mammals.

### Microbiology (MicB)

- 3103. General Microbiology.
- 5105. Biology of Microorganisms.
- 5309. Biocatalysis and Biodegradation. (*Same as* BioC 5309)
- 5352. Applied Microbiology.
- 5611. Microbial Ecology.

### Soil, Water, and Climate (Soil)

- 5605. Microbial Ecology.

## NATURALIST STUDIES

### Agronomy (Agro)

- 1007. Biology of Food Systems and the Environment.
- 3020/5120. Growth and Development of Field Crops.

### Biology (Biol)

- 1103. General Botany.
- 1201. Evolutionary and Ecological Perspectives.
- 1203. Organismal Adaptation and Diversity.
- 3008. Ecology and Evolution.
- 3012. Plant Biology.
- 3812. Plant Biology.
- 5841. Ecology.

### Chemistry (Chem)

- 1003. Physical World, Chemistry.
- 1008. Physical World, Chemistry.

### Ecology, Evolution, and Behavior (EEB)

- 5008. Quaternary Ecology.
- 5014. Ecology of Vegetation.
- 5016. Ecological Plant Geography.
- 5122. Plant/Animal Interactions.
- 5129. Mammalogy.
- 5134. Introduction to Ornithology.
- 5814. Plant Community Ecology.

### Entomology (Ent)

- 3005. Insect Biology.
- 3200. Social Insects.
- 5600. Field Entomology.

### Fisheries and Wildlife (FW)

- 8452. Conservation Biology: Genetic and Demographic Issues.

### Forest Resources (FR)

- 3100. Minnesota Plants.
- 5102. Forest Wildlife Habitat Management.
- 5146. Dynamics of Global Change: Plant Ecology.
- 5152. Forest Genetics.
- 5160. Practicum in Forest Biology and Measurements.
- 5704. Colloquium in Natural Resources.

### General College (GC)

- 1133. Nature Study.

### Geography (Geog)

- 3431. Introduction to Plant and Animal Geography.
- 5441. Quaternary Landscape Evolution.

### Horticultural Science (Hort)

- 1010. Home Horticulture.
- 1021. Woody Plant Materials.
- 1022. Herbaceous Plant Materials.
- 1023. Indoor Plants and Landscapes.
- 1036. Plant Propagation.
- 3001. Growth Regulation of Horticultural Plants.
- 3002. Horticultural Cropping Systems.
- 3003. Plant Genetics and Improvement.
- 3004. Applications of Plant Biotechnology.
- 3010. Growing Plants Organically: What It Means To Be "Green."
- 3030. Landscape Design of Residential and Small Commercial Sites.
- 3040. Landscape Design and Implementation.
- 3072. Turf Management.
- 5001. Harvest to Market of Horticultural Crops.
- 5015. Restoration and Reclamation Ecology.
- 5020. Topics in Plant Science for Teachers.
- 5026. Landscape Management.
- 5031. Temperate Fruit Production.
- 5034. Commercial Vegetable Agriculture.
- 5040. Plant Growth Regulation.
- 5042. Turf Grass Science.
- 5046. Nursery Management I.
- 5047. Nursery Scheduling and Enterprise Development.
- 5048. Nursery Management II.

- 5054. Commercial Floriculture Production Practices.
- 5055. Commercial Floriculture Production Systems.
- 8023. Evolution of Crop Plants.
- 8045. Plant Response to Environmental Stress.

#### Plant Biology (PBio)

- 1009. Minnesota Plant Life.
- 1012. Plants Useful to Humans.
- 3131. Survey of Plant Physiology.
- 3201. Introductory Plant Systematics.
- 5801. Plants and Boreal Flora.

#### Plant Pathology (PIPa)

- 1001. The Good, Bad and Ugly Effects of Microorganisms on Plants and Human Society.
- 1002. Plant Diseases and Your Garden.
- 1003. Diseases of Trees.
- 1004. Diseases of Turfgrass.
- 3001. Management and Control of Field Crop Diseases.
- 3002. Management of Horticultural Crop Diseases.
- 5102. Ecology of Fungi.
- 5201. Biology of Plant Diseases.
- 5203. Physiological and Molecular Plant-Microbe Interactions.
- 5204. Field Plant Pathology.
- 5206. Biology of Fungi.
- 5213. Plant Nematology.
- 5214. Plant Virology.
- 5500. Epidemiology and Ecology of Plant Disease.

#### Soil, Water, and Climate (Soil)

- 5610. Soil Biology.

### PEST AND DISEASE CONTROL

#### Agronomy (Agro)

- 3030/5130. Harvest, Storage and Utilization of Field Crops.
- 5030. Weed Control.
- 5320. Orientation to Agronomy and Soils Field Research.

#### Entomology (Ent)

- 1005. Economic Entomology.
- 5210. Insect Pest Management.
- 5250. Forest Entomology.
- 5280. Livestock Entomology.

- 5610. Aquatic Entomology.
- 8240. Colloquium in Insect Ecology.

#### Horticultural Science (Hort)

- 5034. Commercial Vegetable Agriculture.
- 5048. Nursery Management II.

#### Plant Pathology (PIPa)

- 1001. The Good, Bad and Ugly Effects of Microorganisms on Plants and Human Society.
- 1002. Plant Diseases and Your Garden.
- 1003. Diseases of Trees.
- 1004. Diseases of Turfgrass.
- 3001. Management and Control of Field Crop Diseases.
- 3002. Management of Horticultural Crop Diseases.
- 5201. Biology of Plant Diseases.
- 5203. Physiological and Molecular Plant-Microbe Interactions.
- 5204. Field Plant Pathology.
- 5212. Diseases of Forest and Shade Trees.
- 5213. Plant Nematology.
- 5214. Plant Virology.
- 5500. Epidemiology and Ecology of Plant Disease.

### PUBLIC POLICY

#### Agricultural Engineering Technology (AgET)

- 5027. Appropriate Technology for International Development.

#### Applied Economics (ApEc)

- 5600. Land and Water Economics.
- 5650. Economics of Natural Resource and Environmental Policy.
- 5710. U.S. Agriculture: Farm, Food and Environmental Policy.
- 5730. European Agriculture: Farm, Food and Environmental Policy.

#### Architecture (Arch)

- 5711. Design Principles of the Urban Landscape.

#### Biology (Biol)

- 1051/3051. Environmental Studies.
- 5951. Social Uses of Biology.

#### Chemical Engineering (ChEn)

- 5904. Special Topics: Environmental Engineering for Chemical Engineers.

Civil Engineering (CE)

- 5099. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as* HSem 3030, Mgmt 5101, PA 5793, PubH 5150)
- 5580. Introduction to Environmental Law for Engineers.

Economics (Econ)

- 3611. Environmental Economics.

Environmental and Occupational Health (PubH)

- 5150. Regulatory and Legal Framework of Solid Waste Management.
- 5215. Applied Occupational Toxicology.

Forest Resources (FR)

- 5257. Recreation Land Policy.

Geography (Geog)

- 5601. Introduction to Land Use Planning. (*Same as* PA 5601)

Honors Seminar (HSem)

- 3030. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as* CE 5099, Mgmt 5101, PA 5793, PubH 5150)

Horticultural Science (Hort)

- 5015. Restoration and Reclamation Ecology.
- 5048. Nursery Management II.

Interdepartmental Study (ID)

- 3970. Directed Studies.
- 5525-5526. Garbage, Government, and the Globe.

International Relations (IntR)

- 3900. Topics in International Relations: Environment and Development in the Third World.
- 3900. Topics in International Relations: The Ecology of Development.

Landscape Architecture (LA)

- 5572. Landscape Construction: Spatial Performance.
- 8223. Regional Landscape Design.

Law School (Law)

- 5215. Environmental Law.
- 5885. Advanced Environmental Law.

Liberal Studies (LS)

- 5610. Environmental Ethics, Politics, and Public Policy.

Management (Mgmt)

- 5101. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as* CE 5099, HSem 3030, PA 5793, PubH 5150)

Natural Resources and Environmental Studies (NRES)

- 1040. Natural Resources as Raw Materials.
- 3100. Conservation of Biodiversity.
- 5240. Natural Resources Policy and Administration.
- 5242. Management of Natural Resources Conflict.

Political Science (Pol)

- 3872/5872. International Organizations and the Environment.
- 5410. Advanced Topics in Government and Politics: Politics of Environmental Movements.
- 5523. The Politics of the Regulatory Process.

Public Affairs (PA)

- 5251. Environmental Planning.
- 5701. Science and State I.
- 5711. Energy Policy.
- 5713. Energy Regulation: Analysis and Advocacy.
- 5721. Environmental Policy.
- 5731. Technology Policy.
- 5732. Science, Technology and International Affairs.
- 5741. Economics of Environmental and Resource Policy.
- 5793. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as* CE 5099, HSem 3030, Mgmt 5101, PubH 5150)
- 5794. Nuclear Power: Friend or Foe.
- 5892. Strategies for Sustainable Development.
- 879x. Workshop/Seminar: Advanced Topics in Technology, Energy, and Environmental Policy.

Recreation, Park, and Leisure Studies (Rec)

- 5160. Recreation Land Policy.

Science in Agriculture (ScAg)

- 1500. Biotechnology: Basic Concepts and Applications.

Soil Science (Soil)

- 1020. The Soil Resource.
- 5020. Environmental Impact Assessment.

Strategic Management and Organization (BGS)

- 3003. Business and the Natural Environment.
- 3019/H3019. Topics in Business, Government and Society.
- 8019. Topics in Business and Society.

Sustainable Agriculture (SAgr)

- 8010. Colloquium in Sustainable Agriculture.

**RECREATION****Curriculum and Instruction (CI)**

- 5501. Workshop: Outdoor Science Education.

**Forest Resources (FR)**

- 5231. Range Management.
- 5232. Management of Recreational Lands.
- 5236. Forest Recreation Planning.
- 5257. Recreation Land Policy.
- 5259. Analysis of Outdoor Recreation Behavior.

**Horticultural Science (Hort)**

- 3072. Turf Management.
- 5026. Landscape Management.

**Landscape Architecture (LA)**

- 8222. The Landscape Architectural Design of Community Places.
- 8232. Design of Recreational Landscapes.

**Natural Resources and Environmental Studies (NRES)**

- 5245. Fundamentals of Landscape Planning for Recreation.

**Recreation, Park, and Leisure Studies (Rec)**

- 5160. Recreation Land Policy.
- 5250. Financing Leisure Services.
- 5310. Programming Outdoor and Environmental Education.
- 5350. Wilderness Outdoor Recreation Programming.

**RESOURCE MANAGEMENT****Anthropology (Anth)**

- 5117. Natural Resources Anthropology.

**Applied Economics (ApEc)**

- 3610. Resource Development and Environmental Economics.
- 5650. Economics of Natural Resource and Environmental Policy.
- 8264. Resource Economics.
- 8364. Seminar: Environmental Economics and Policy.

**Design, Housing, and Apparel (DHA)**

- 1401. Residential Technology.
- 5482. The Family and Energy Issues.
- 5634. Interior Design Codes and Environmental Issues.

**Economics (Econ)**

- 3611. Environmental Economics.
- 5611. Resource and Environmental Economics.

**Fisheries and Wildlife (FW)**

- 5455. Aquaculture.
- 5620. Geographical Information Systems (GIS) for Fisheries, Wildlife, and Biological Conservation.

**Forest Resources (FR)**

- 3103. Meteorology and Climatology for Resource Managers.
- 3250. Role of Renewable Natural Resources in Developing Countries.
- 3300. Elements of Surveying.
- 5102. Forest Wildlife Habitat Management.
- 5130. Geographic Information Systems in Natural Resource Analysis.
- 5202. Remote Sensing: Field Applications.
- 5222. Forest Resources Inventory.
- 5228. Advanced Topics in Resource Assessment and Modeling.
- 5231. Range Management.
- 5250. Role of Renewable Natural Resources in Developing Countries.
- 5262. Remote Sensing of Natural Resources.
- 5270. Forest Management and Planning.
- 5403. Fundamentals of Natural Resource Education.
- 5412. Advanced Remote Sensing.
- 5704. Colloquium in Natural Resources.
- 8205. Research Problems: Remote Sensing.
- 8211. Seminar: Natural Resource Policy Issues.

**Geography (Geog)**

- 1402. Geography and Environmental Systems.
- 5565. Geographical Analysis of Environmental Systems and Global Change.

**Geology (Geo)**

- 3005. Earth Resources.

**International Relations (IntR)**

- 3900. Topics in International Relations: Natural Resource and Environmental Policy in the Third World.
- 3900. Topics in International Relations: Environment and Development in the Third World.

**Natural Resources and Environmental Studies (NRES)**

- 1001. Orientation to Natural Resources and Environmental Studies.
- 1020. Information Technology in Natural Resources.
- 1040. Natural Resources as Raw Materials.

- 1201. Conservation of Natural Resources.
- 3001. Colloquium in Natural Resources and Environmental Studies.
- 3010. Ethics and Values in Resource Management.
- 3050. Experience and Training in a Field Setting.
- 3060/5060. Water Quality in Natural Resource Management.
- 3201. Field Assessment Techniques.
- 3202. Leadership and Management Skills Development.
- 3225. NRES Directed Study Experience.
- 5060. Water Quality in Natural Resource Management.
- 5100. Problem Solving in Natural Resources and Environmental Studies.
- 5101. Integrated Natural Resource Management.
- 5102. GIS for Problem Solving in Environmental Science and Management.
- 5210. Survey, Measurement, and Modeling Methods for Natural Resources I.
- 5220. Survey Measurement and Modeling Methods for Natural Resources II.
- 5225. NRES Directed Study Experience.
- 5242. Management of Natural Resources Conflict.
- 5260. Economics and Natural Resources Management.
- 5800. Natural Resources Interpretation and Communication.

**Public Affairs (PA)**

- 5741. Economics of Environmental and Resource Policy.

**SOIL RESOURCES**

**Agronomy (Agro)**

- 5320. Orientation to Agronomy and Soils Field Research.

**Biostatistics and Agricultural Engineering (BAE)**

- 3052. Engineering Principles of Soil-Water-Plant Systems.
- 5540. Watershed Engineering.
- 5550. Water Management Engineering.
- 5560. Mechanics of Flow in the Unsaturated Zone.
- 8700. Coupled Moisture, Heat and Chemical Transfer in Porous Media.

**Environmental and Occupational Health (PubH)**

- 5186. Environmental Chemistry.

**Forest Resources (FR)**

- 5126. Silviculture: Soil-Site Relationships.
- 8106. Topics in Silviculture: Forest Soils.

**Soil Science (Soil)**

- 1020. The Soil Resource.
- 3125. Basic Soil Science.
- 3220. Soil Conservation and Land Use Management.
- 3416. Plant Nutrients in the Environment.

- 5210. Environmental Biophysics.
- 5232. Soil Physics.
- 5310. Soil Chemistry.
- 5510. Field Study of Soils.
- 5550. Peatlands: Formation, Classification, and Utilization.
- 5555. Wetland Soils.
- 5610. Soil Biology.
- 8250. Advanced Soil Physics.

**TECHNOLOGY**

**Agricultural Engineering Technology (AgET)**

- 5027. Appropriate Technology for International Development.

**Biology (Biol)**

- 5951. Social Uses of Biology.

**Chemical Engineering (ChEn)**

- 5751. Chemical Engineering in Biotechnology and Environment.

**Civil Engineering (CE)**

- 5513. Solid and Hazardous Waste Processing II.

**Design, Housing, and Apparel (DHA)**

- 1401. Residential Technology.

**Forest Products (ForP)**

- 5305. Pulp and Paper Technology.
- 5320. Biological and Environmental Science of Pulp and Paper.

**History of Science (HSci)**

- 3331/5331. Technology in American Culture.

**Horticultural Science (Hort)**

- 3001. Growth Regulation of Horticultural Plants.
- 3003. Plant Genetics and Improvement.
- 3004. Applications of Plant Biotechnology.

**Interdepartmental Study (ID)**

- 5525-5526. Garbage, Government, and the Globe.

**Landscape Architecture (LA)**

- 8574. Landscape Construction: Mechanical Systems.

**Mechanical Engineering (ME)**

- 5613. Principles of Particle Technology.
- 5614. Principles of Particle Technology.
- 5620. Clean Room Technology and Particle Monitoring.



**Microbiology (MicB)**

- 5352. Applied Microbiology.
- 5611. Microbial Ecology.

**Natural Resources and Environmental Studies (NRES)**

- 1020. Information Technology in Natural Resources.
- 1040. Natural Resources as Raw Materials.

**Public Affairs (PA)**

- 5701. Science and State I.
- 5721. Environmental Policy.
- 5731. Technology Policy.
- 5732. Science, Technology and International Affairs.
- 879x. Workshop/Seminar: Advanced Topics in Technology, Energy, and Environmental Policy.

**Science in Agriculture (ScAg)**

- 1500. Biotechnology: Basic Concepts and Applications.

**Soil Science (Soil)**

- 5605. Microbial Ecology.

**Strategic Management and Organization (BGS)**

- 3003. Business and the Natural Environment.

**WASTE MANAGEMENT****Applied Economics (ApEc)**

- 5990. Applied Economics of Solid Waste Management.

**Biology (Biol)**

- 1051/3051. Environmental Studies.

**Biostatistics and Agricultural Engineering (BAE)**

- 5910. Agricultural Waste Management Engineering.

**Chemical Engineering (ChEn)**

- 5751. Chemical Engineering in Biotechnology and Environment.

**Civil Engineering (CE)**

- 5099. Preventing Pollution: Innovative Approaches to Environmental Management.
- 5501. Analysis and Design of Wastewater Systems.
- 5504. Mass Transport with Environmental Applications.
- 5510. Solid and Hazardous Waste Management.
- 5512. Solid and Hazardous Waste Processing I.
- 5513. Solid and Hazardous Waste Processing II.
- 5515. Water and Wastewater Microbiology.

- 8500. Physical and Chemical Processes for Water and Wastewater Treatment I.
- 8501. Physical and Chemical Processes for Water and Wastewater Treatment II.
- 8502. Biological and Chemical Processes for Wastewater Treatment.

**Environmental and Occupational Health (PubH)**

- 5150. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management.
- 5150. Sec. 2. Regulatory and Legal Framework of Solid Waste Management.
- 5233. Biological Safety.
- 5253. Introduction to Hazardous Waste Management.
- 5255. Hazardous Materials Management.

**Forest Products (ForP)**

- 5305. Pulp and Paper Technology.
- 5320. Biological and Environmental Science of Pulp and Paper.

**Interdepartmental Study (ID)**

- 5525-5526. Garbage, Government, and the Globe.

**Law School (Law)**

- 5885. Advanced Environmental Law.

**Management (Mgmt)**

- 5101. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management.
- 5101. Sec. 2. Solid Waste Management Policy and Administration.

**Public Affairs (PA)**

- 5793. Preventing Pollution: Innovative Approaches to Environmental Management.
- 879x. Workshop/Seminar: Advanced Topics in Technology, Energy, and Environmental Policy.

**Soil Science (Soil)**

- 5600. Principles of Waste Management.

**WATER RESOURCES (See also LAKES AND WETLANDS)****Agricultural Engineering Technology (AgET)**

- 5410. Hydrology and Water Quality.

**Applied Economics (AgEc)**

- 5600. Land and Water Economics.

**Biology (Biol)**

- 5850. Biological, Chemical and Physical Aspects of Lakes.

**Biostatistics and Agricultural Engineering (BAE)**

- 3052. Engineering Principles of Soil-Water-Plant Systems.
- 5540. Watershed Engineering.
- 5550. Water Management Engineering.
- 8500. Hydrologic Modeling - Small Watersheds.

**Civil Engineering (CE)**

- 5401. Water Resources Engineering.
- 5402. Computational Hydraulics.
- 5403. Hydraulic Structures.
- 5405. Hydrology and Hydrologic Design.
- 5410. Open Channel Hydraulics.
- 5425. Groundwater Mechanics.
- 5426. Computer Modeling of Groundwater Flow.
- 5500. Analysis and Design of Water Supply Systems.
- 5501. Analysis and Design of Wastewater Systems.
- 5504. Mass Transport with Environmental Applications.
- 5505. Water Quality Engineering.
- 5506. Environmental Water Chemistry.
- 5507. Environmental Engineering Laboratory.
- 5515. Water and Wastewater Microbiology.
- 5540. Analysis of Groundwater-Soil Pollution Abatement Technology.
- 8407. Stochastic Hydrology.
- 8413. Mechanics of Sediment Transport.
- 8419. Computational Hydrodynamics II.
- 8425. Advanced Groundwater Mechanics I.
- 8426. Advanced Groundwater Mechanics II.
- 8500. Physical and Chemical Processes for Water and Wastewater Treatment I.
- 8501. Physical and Chemical Processes for Water and Wastewater Treatment II.
- 8502. Biological and Chemical Processes for Wastewater Treatment.
- 8505. Aquatic Chemistry for Environmental Engineers.
- 8506. Aquatic Chemistry for Environmental Engineers.
- 8507. Environmental Processing of Organic Chemicals.
- 8508. Groundwater Microbiology.
- 8540. Interfacial Mass Transfer with Environmental Applications.
- 8550. Analysis and Modeling of Aquatic Environments.
- 8551. Seminar: Models of Aquatic Environments.

**Ecology, Evolution, and Behavior (EEB)**

- 5608. Ecosystems: Form and Function.

**Entomology (Ent)**

- 5360. Aquatic Entomology.

**Environmental and Occupational Health (PubH)**

- 5186. Environmental Chemistry.

**Fisheries and Wildlife (FW)**

- 5460. Pollution Impacts on Aquatic Systems.
- 8459. Stream and River Ecology.
- 8460. Fish Habitats and Restoration.

**Forest Resources (FR)**

- 5114. Forest Hydrology and Watershed Management.
- 5115. Forest Hydrology, Field Applications.
- 5153. Advanced Forest Hydrology.
- 5460. Water Quality: The International Dimension.

**Geography (Geog)**

- 5444. Water Resources, Individuals and Institutions.

**Geology and Geophysics (Geo)**

- 3006. Water and Society.
- 5313. Aqueous Geochemistry.
- 5641. General and Physical Hydrogeology.
- 5642. Quantitative Hydrogeology.
- 5643. Chemical Hydrogeology.
- 8612. Analytical Geohydrology.

**Natural Resources and Environmental Studies (NRES)**

- 3060/5060. Water Quality in Natural Resource Management.
- 5575. Wetlands Conservation.
- 5703. Agroforestry: Role in Watershed Management.

**Soil Science (Soil)**

- 5210. Environmental Biophysics.
- 5232. Soil Physics.
- 5310. Soil Chemistry.
- 8250. Advanced Soil Physics.

**Water Resources Science (WRS)**

- 5010. Introduction into Field Research in Water Resources.
- 5101. Water Resources: Individuals and Institutions.
- 8100. Interdisciplinary Seminar in Water Resources.

## II. COURSES LISTED BY DEPARTMENT

### AEROSPACE ENGINEERING AND MECHANICS (AEM)

*Institute of Technology*  
107 Akerman, 625-8000  
Theodore Wilson, 107 Akerman, 625-0856

AEM 5687. Introduction to Acoustics and Environmental Noise.

### AGRICULTURAL ENGINEERING TECHNOLOGY (AgET)

*College of Agricultural, Food, and Environmental Sciences*  
213 Biosystems and Agricultural Engineering, 625-7733  
J. L. Nieber, 203 Biosystems and Agricultural Engineering, 625-6724;  
nieber@gaia.bae.umn.edu  
C. J. Clanton, 230 Biosystems and Agricultural Engineering, 625-9218;  
clant001@tc.umn.edu  
B.N. Wilson, 205 Biosystems and Agricultural Engineering, 625-6770;  
wilson@tc.umn.edu

AgET 5027. Appropriate Technology for International Development.

AgET 5410. Hydrology and Water Quality.

AgET 5450. Environmental Impacts of Food Production.

### AGRONOMY AND PLANT GENETICS (Agro)

*College of Agricultural, Food, and Environmental Sciences*  
411 Borlaug Hall, 625-7773  
Leland L. Hardman, 301 Hayes Hall, 625-6226

Agro 1007. Biology of Food Systems and the Environment.

Agro 1010. Principles of Agronomy.

Agro 3020/5120. Growth and Development of Field Crops.

Agro 3030/5130. Harvest, Storage and Utilization of Field Crops.

Agro 5020. Introduction to Plant Breeding.

Agro 5030. Weed Control.

Agro 5050. Management Technologies for Crop Production in Minnesota.

Agro 5200. World Food Problems.

Agro 5310. Orientation to Field Crop Breeding.

Agro 5320. Orientation to Agronomy and Soils Field Research.

### ANIMAL AND PLANT SYSTEMS (AnPI)

*College of Agricultural, Food, and Environmental Sciences*  
411 Borlaug Hall, 625-7773  
Steve Simmons, 411 Borlaug Hall, 625-3763

AnPI 3010. Environment and World Food Production.

AnPI 5060. Integrated Management of Cropping Systems.

### ANTHROPOLOGY (Anth)

*College of Liberal Arts*  
215 Ford Hall, 625-3400  
L. P. Gerlach, 219 Ford Hall, 625-5542

Anth 1101. Human Origins.

Anth 1101H. Human Origins.

Anth 3116. Ecological Anthropology.

Anth 5117. Natural Resources Anthropology.

Anth 5960. Senior Seminar: Human/Environment Interactions.

### APPLIED ECONOMICS (ApEc)

*College of Agricultural, Food, and Environmental Sciences*  
231 Classroom Office Building, 625-1222  
Frances Homans, 217F Classroom Office Building, 625-6220;  
fhomans@dept.agecon.umn.edu

ApEc 3610. Resource Development and Environmental Economics.

ApEc 5600. Land and Water Economics.

ApEc 5650. Economics of Natural Resource and Environmental Policy.

ApEc 5710. U.S. Agriculture: Farm, Food and Environmental Policy.

ApEc 5730. European Agriculture: Farm, Food and Environmental Policy.

ApEc 5990. Applied Economics of Solid Waste Management.

ApEc 8264. Resource Economics.

ApEc 8360. Land Economics and Policy.

ApEc 8364. Seminar: Environmental Economics and Policy.

### ARCHITECTURE (Arch)

*College of Architecture and Landscape Architecture*  
110 Architecture, 624-7866  
Lee Anderson, 110 Architecture, 624-7866;  
landerso@boombox.micro.umn.edu

- Arch 1401. The Designed Environment.
- Arch 3501. People, Environment, and Design.
- Arch 5458. Architecture and Culture.
- Arch 5523. Light Frame Buildings: Design for Energy Efficiency, Health, and Durability.
- Arch 5531. Lighting and Acoustic Design.
- Arch 5539. Daylighting and Architectural Design.
- Arch 5541. Thermal Design in Architecture.
- Arch 5542. Building Energy Systems.
- Arch 5543. Climate and Architecture.
- Arch 5711. Design Principles of the Urban Landscape.
- Arch 5725. Housing and Values.

### ASTRONOMY (Ast)

*Institute of Technology*  
356 Physics, 624-0211  
Terry Jones, 355 Physics, 624-8009

- Ast 1019. Our Changing Planet.
- Ast 1021H. Introduction to Astronomy.
- Ast 1031. Exploring the Universe: A.
- Ast 1032. Exploring the Universe: L.

### BIOCHEMISTRY (BioC)

*College of Biological Sciences*  
140 Gortner Lab, 624-7755  
Kathleen Peterson, 223 Snyder Hall, 624-9717

- BioC 5301. Ecological Biochemistry.
- BioC 5309. Biocatalysis and Biodegradation. (Same as MicB 5309)

### BIOLOGY (Biol)

*College of Biological Sciences*  
123 Snyder Hall, 624-2244  
Kathleen Peterson, 223 Snyder Hall, 624-9717

- Biol 1051/3051. Environmental Studies.
- Biol 1103. General Botany.
- Biol 1201. Evolutionary and Ecological Perspectives.
- Biol 1203. Organismal Adaptation and Diversity.
- Biol 3008. Ecology and Evolution.
- Biol 3012. Plant Biology.
- Biol 3812. Plant Biology.
- Biol 5013. Biology of Microorganisms.
- Biol 5841. Ecology.
- Biol 5850. Biological, Chemical and Physical Aspects of Lakes.
- Biol 5951. Social Uses of Biology.

### BIOSYSTEMS AND AGRICULTURAL ENGINEERING (BAE)

*Institute of Technology*  
213 Biosystems and Agricultural Engineering, 625-7733  
J. L. Nieber, 203 Biosystems and Agricultural Engineering, 625-6724;  
nieber@gaia.bae.umn.edu  
C. J. Clanton, 230 Biosystems and Agricultural Engineering, 625-9218;  
clant001@tc.umn.edu  
B.N. Wilson, 205 Biosystems and Agricultural Engineering, 625-6770;  
wilson@tc.umn.edu

- BAE 3052. Engineering Principles of Soil-Water-Plant Systems.
- BAE 5540. Watershed Engineering.
- BAE 5550. Water Management Engineering.
- BAE 5560. Mechanics of Flow in the Unsaturated Zone.
- BAE 5745. Ventilating Systems for Indoor Air Quality.
- BAE 5910. Agricultural Waste Management Engineering.
- BAE 8500. Hydrologic Modeling - Small Watersheds.
- BAE 8700. Coupled Moisture, Heat and Chemical Transfer in Porous Media.

**CHEMICAL ENGINEERING AND MATERIALS SCIENCE (ChEn)***Institute of Technology**151 Amundson Hall, 625-1313**Theodore M. Zorn, 151 Amundson Hall, 625-1524*

ChEn 5751. Chemical Engineering in Biotechnology and Environment.

ChEn 5904. Special Topics: Environmental Engineering for Chemical Engineers.

**CHEMISTRY (Chem)***Institute of Technology**139 Smith Hall, 624-6000**Barbara Edgar, 113 Smith Hall, 624-0062*

Chem 1003. Physical World, Chemistry.

Chem 1008. Physical World, Chemistry.

Chem 1051-1052. Chemical Principles I-II.

Chem 1051H-1052H. Honors Chemical Principles I-II.

**CIVIL ENGINEERING (CE)***Institute of Technology**122 Civil and Mineral Engineering, 625-5522**M. Semmens, 150 Civil and Mineral Engineering, 625-9857**W. Maier, 148 Civil and Mineral Engineering, 625-3016*

CE 3500. Principles of Environmental Engineering.

CE 5004. Underground Construction Engineering.

CE 5099. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as HSem 3030, Mgmt 5101, PA 5793, PubH 5150*)

CE 5401. Water Resources Engineering.

CE 5402. Computational Hydraulics.

CE 5403. Hydraulic Structures.

CE 5405. Hydrology and Hydrologic Design.

CE 5410. Open Channel Hydraulics.

CE 5425. Groundwater Mechanics.

CE 5426. Computer Modeling of Groundwater Flow.

CE 5500. Analysis and Design of Water Supply Systems.

CE 5501. Analysis and Design of Wastewater Systems.

CE 5504. Mass Transport with Environmental Applications.

CE 5505. Water Quality Engineering.

CE 5506. Environmental Water Chemistry.

CE 5507. Environmental Engineering Laboratory.

CE 5510. Solid and Hazardous Waste Management.

CE 5512. Solid and Hazardous Waste Processing I.

CE 5513. Solid and Hazardous Waste Processing II.

CE 5515. Water and Wastewater Microbiology.

CE 5540. Analysis of Groundwater-Soil Pollution Abatement Technology.

CE 5580. Introduction to Environmental Law for Engineers.

CE 8407. Stochastic Hydrology.

CE 8413. Mechanics of Sediment Transport.

CE 8419. Computational Hydrodynamics II.

CE 8425. Advanced Groundwater Mechanics I.

CE 8426. Advanced Groundwater Mechanics II.

CE 8430. Lake and Reservoir Hydrodynamics.

CE 8500. Physical and Chemical Processes for Water and Wastewater Treatment I.

CE 8501. Physical and Chemical Processes for Water and Wastewater Treatment II.

CE 8502. Biological and Chemical Processes for Wastewater Treatment.

CE 8505. Aquatic Chemistry for Environmental Engineers.

CE 8506. Aquatic Chemistry for Environmental Engineers.

CE 8507. Environmental Processing of Organic Chemicals.

CE 8508. Groundwater Microbiology.

CE 8509. Environmental Microbiology.

CE 8540. Interfacial Mass Transfer with Environmental Applications.

CE 8550. Analysis and Modeling of Aquatic Environments.

CE 8551. Seminar: Models of Aquatic Environments.

**CULTURAL STUDIES AND COMPARATIVE LITERATURE (CSCL)***College of Liberal Arts.**350 Folwell Hall, 624-8099**W. John Archer, 103 Folwell Hall, 624-3830*

CSCL 3361. Visions of Nature: The Natural World and Political Thought.

CSCL 3366. Landscape and Ideology, 1600-1875.

### **CURRICULUM AND INSTRUCTION (CI)**

*College of Education and Human Development*  
125 Peik Hall, 625-6372  
Judy H. Payne, 145 Peik Hall, 625-9809

- CI 5145. Curriculum Topics: Using Como Zoo and Conservatory to Promote Inquiry Teaching.
- CI 5501. Workshop: Leaves and Trees: Find the Forest in Your Environment.
- CI 5537. Environmental Education in Sweden: An International Experience.
- CI 5537. Global Environmental Education.
- CI 5537. Principles of Environmental Education.
- CI 5747. Global Environmental Education: Content and Practice.

### **DESIGN, HOUSING, AND APPAREL (DHA)**

*College of Human Ecology*  
240 McNeal Hall, 624-9700  
Denise A. Guerin, 240 McNeal Hall, 626-1257

- DHA 1101. Introduction to the Designed Environment.
- DHA 1401. Residential Technology.
- DHA 3463. Environment: Housing and Community.
- DHA 3631. Interior Design Resources and Materials.
- DHA 3633. Lighting Design for Environmental Spaces.
- DHA 5482. The Family and Energy Issues.
- DHA 5634. Interior Design Codes and Environmental Issues.

### **ECOLOGY, EVOLUTION, AND BEHAVIOR (EEB)**

*College of Biological Sciences*  
100 Ecology, 625-5700  
Kathleen Peterson, 223 Snyder Hall, 624-9717

- EEB 1019. Our Changing Planet.
- EEB 3001. Introduction to Ecology.
- EEB 3008. Ecology and Evolution.
- EEB 5004. Earth System: Geosphere/Biosphere Interactions.
- EEB 5008. Quaternary Ecology.
- EEB 5014. Ecology of Vegetation.
- EEB 5016. Ecological Plant Geography.
- EEB 5051. Analysis of Populations.

- EEB 5122. Plant/Animal Interactions.
- EEB 5129. Mammalogy.
- EEB 5134. Introduction to Ornithology.
- EEB 5136. Ichthyology.
- EEB 5601. Limnology.
- EEB 5608. Ecosystems: Form and Function.
- EEB 5621. Limnology Laboratory.

### **Courses Offered at Lake Itasca Forestry and Biological Station**

- EEB 5814. Plant Community Ecology.
- EEB 5817. Vertebrate Ecology.
- EEB 5834. Field Ornithology.

### **ECONOMICS (Econ)**

*College of Liberal Arts*  
1035 Management and Economics, 625-6353  
Simran Sahi, 1035 Management and Economics, 625-6353

- Econ 3611. Environmental Economics.
- Econ 5611. Resource and Environmental Economics.

### **ENTOMOLOGY (Ent)**

*College of Agricultural, Food, and Environmental Sciences*  
219 Hodson Hall, 624-3636  
David W. Ragsdale, 416 Hodson Hall, 624-3636

- Ent 1005. Economic Entomology.
- Ent 3005. Insect Biology.
- Ent 3200. Social Insects.
- Ent 5040. Insect Ecology.
- Ent 5210. Insect Pest Management.
- Ent 5250. Forest Entomology.
- Ent 5280. Livestock Entomology.
- Ent 5320. Ecology of Agriculture.
- Ent 5360. Aquatic Entomology.
- Ent 5600. Field Entomology.
- Ent 5610. Aquatic Entomology.
- Ent 8240. Colloquium in Insect Ecology.

**ENVIRONMENTAL AND OCCUPATIONAL HEALTH (PubH)**

*School of Public Health  
1151 Mayo Memorial Building, 626-0900  
Kathleen Soupir, 807 Mayo, 625-0622*

- PubH 5027. Community and Environmental Approaches to Health Behavior Change.
- PubH 5150. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as* CE 5099, HSem 3030, Mgmt 5101, PA 5793)
- PubH 5150. Sec. 2. Regulatory and Legal Framework of Solid Waste Management.
- PubH 5151. Environmental Health.
- PubH 5152. Environmental Health.
- PubH 5155. Issues in Environmental and Occupational Health.
- PubH 5158. Health Risk Evaluation.
- PubH 5171. Environmental Microbiology.
- PubH 5181. Air Pollution.
- PubH 5184. Measurement of Airborne Contaminants in Workplaces.
- PubH 5186. Environmental Chemistry.
- PubH 5201. Radiation Protection and Measurement.
- PubH 5202. Radiation Laboratory.
- PubH 5211. Survey of Industrial Hygiene.
- PubH 5212. Ventilation Control of Environmental Hazards.
- PubH 5215. Applied Occupational Toxicology.
- PubH 5216. Properties of Workplace Airborne Contaminants.
- PubH 5220. Ventilation Control of Occupational Hazards.
- PubH 5221. Noise in the Workplace.
- PubH 5233. Biological Safety.
- PubH 5239. Microbiology of the Human Environment: Seminar.
- PubH 5253. Introduction to Hazardous Waste Management.
- PubH 5255. Hazardous Materials Management.
- PubH 5261. General Environmental Toxicology.
- PubH 5267. Industrial and Occupational Toxicology.
- PubH 8185. Analysis of Toxicants.
- PubH 8264. Human Diseases Caused by Environmental Agents.

**ENVIRONMENTAL SCIENCE (ES)**

*College of Agriculture, Food, and Environmental Science  
Terence H. Cooper, 439 Borlaug Hall, 625-7747*

- ES 1001. Orientation to Environmental Science.
- ES 1010. Issues in the Environment.
- ES 3050. Field or Work Experience in Environmental Science.

**FISHERIES AND WILDLIFE (FW)**

*College of Natural Resources  
200 Hodson Hall, 624-3600  
Ira Adelman, 204 Hodson Hall, 624-4228*

- FW 1001. Orientation in Fisheries and Wildlife.
- FW 1002. Wildlife: Ecology, Values and Human Impact.
- FW 3052. Introduction to Fisheries and Wildlife Conservation.
- FW 3054. Biological Conservation: An Ecosystem Approach.
- FW 5129. Mammalogy.
- FW 5455. Aquaculture.
- FW 5459. Fish Physiology.
- FW 5460. Pollution Impacts on Aquatic Systems.
- FW 5461. The Behavior of Fishes.
- FW 5570. Avian Conservation.
- FW 5601. Fisheries Population Analysis.
- FW 5603. Wildlife Habitats and Management.
- FW 5604. Fisheries Ecology and Management.
- FW 5620. Geographical Information Systems (GIS) for Fisheries, Wildlife, and Biological Conservation.
- FW 8448. Fishery Science.
- FW 8452. Conservation Biology: Genetic and Demographic Issues.
- FW 8459. Stream and River Ecology.
- FW 8460. Fish Habitats and Restoration.
- FW 8576. Wildlife Management: Large Mammals.

**FOREST PRODUCTS (ForP)** (Now WOOD AND PAPER SCIENCE)*College of Natural Resources**203 Kaufert Laboratory, 625-5200**Shri Ramaswamy, 625-5200, 206 Kaufert Laboratory;**ramaswa@forestry.umn.edu*

ForP 5305. Pulp and Paper Technology.

ForP 5320. Biological and Environmental Science of Pulp and Paper.

**FOREST RESOURCES (FR)***College of Natural Resources**115 Green Hall, 624-3400**Alan Ek, 115 Green Hall, 624-3400;**ae@forestry.umn.edu*

FR 1001. Forest Resources Orientation.

FR 1100. Dendrology.

FR 3100. Minnesota Plants.

FR 3101. Northern Forest Ecosystems.

FR 3103. Meteorology and Climatology for Resource Managers.

FR 3104. Forest Ecology.

FR 3107. Forest Ecology Laboratory.

FR 3201. Forest Measurement Techniques.

FR 3225/5225. Directed Study Experience.

FR 3250. Role of Renewable Natural Resources in Developing Countries.

FR 3300. Elements of Surveying.

FR 3500. Arboriculture.

FR 5100. Silviculture.

FR 5101. Field Silviculture.

FR 5102. Forest Wildlife Habitat Management.

FR 5104. Forest Ecology.

FR 5107. Forest Ecology Laboratory.

FR 5108. Physiological Ecology: Organisms to Ecosystems.

FR 5114. Forest Hydrology and Watershed Management.

FR 5115. Forest Hydrology, Field Applications.

FR 5120. Tree Biology.

FR 5126. Silviculture: Soil-Site Relationships.

FR 5130. Geographic Information Systems in Natural Resource Analysis.

FR 5142. Tropical Forest Ecology.

FR 5146. Dynamics of Global Change: Plant Ecology.

FR 5152. Forest Genetics.

FR 5153. Advanced Forest Hydrology.

FR 5160. Practicum in Forest Biology and Measurements.

FR 5202. Remote Sensing: Field Applications.

FR 5215. Forest Fire Ecology and Management.

FR 5218. Assessment and Modeling of Forests.

FR 5222. Forest Resources Inventory.

FR 5228. Advanced Topics in Resource Assessment and Modeling.

FR 5231. Range Management.

FR 5232. Management of Recreational Lands.

FR 5236. Forest Recreation Planning.

FR 5248. Harvesting and Engineering.

FR 5250. Role of Renewable Natural Resources in Developing Countries.

FR 5257. Recreation Land Policy.

FR 5259. Analysis of Outdoor Recreation Behavior.

FR 5262. Remote Sensing of Natural Resources.

FR 5264. Quantitative Techniques in Forest Management.

FR 5270. Forest Management and Planning.

FR 5403. Fundamentals of Natural Resource Education.

FR 5412. Advanced Remote Sensing.

FR 5460. Water Quality: The International Dimension.

FR 5500. Urban Forest Management.

FR 5703. Colloquium in Forest Biology.

FR 5704. Colloquium in Natural Resources.

FR 8100. Research Problems: Silviculture.

FR 8101. Research Problems: Forest Tree Physiology.

FR 8102. Research Problems: Forest Tree Genetics.

FR 8103. Research Problems: Forest Hydrology.

FR 8104. Research Problems: Forest Ecology.

FR 8106. Topics in Silviculture: Forest Soils.

FR 8107. Seminar: Forest Resources.

FR 8112. Research Problems: Physiological Ecology.

FR 8200. Research Problems: Forest Management.

FR 8201. Research Problems: Forest Economics.

FR 8202. Research Problems: Forest Biometry.

FR 8203. Research Problems: Forest Recreation.

FR 8204. Research Problems: Forest Policy.



- FR 8205. Research Problems: Remote Sensing.  
 FR 8207. Economic Analysis of Forestry Projects.  
 FR 8211. Seminar: Natural Resource Policy Issues.  
 FR 8301. Teaching Practicum.

### GENERAL COLLEGE (GC)

340 Appleby Hall, 625-5529

Jay Hatch, 340 Appleby Hall, 625-9346

- GC 1111. Science in Context: Weather and Climate.  
 GC 1112. Ecological Evaluation of Environmental Problems.  
 GC 1133. Nature Study.  
 GC 1171. Physical Geology.  
 GC 1173. Geology of the National Parks.

### GEOGRAPHY (Geog)

College of Liberal Arts

414 Social Sciences, 625-6080

Deb Martin, Undergraduate Advising, 408 Social Sciences, 625-0133

Bonnie Williams, Graduate Advising, 414 Social Sciences, 625-6080

- Geog 1402. Geography and Environmental Systems.  
 Geog 1425. Introduction to Meteorology.  
 Geog 3361. Land Use and the Federal Government.  
 Geog 3362. Land Use and State Government.  
 Geog 3421. Climatology.  
 Geog 3431. Introduction to Plant and Animal Geography.  
 Geog 5361. Land in America.  
 Geog 5423. Climate Models and Modeling.  
 Geog 5424. Applied Climatology.  
 Geog 5426. Climate Variations.  
 Geog 5441. Quaternary Landscape Evolution.  
 Geog 5444. Water Resources, Individuals and Institutions.  
 Geog 5565. Geographical Analysis of Environmental Systems and Global Change.  
 Geog 5601. Introduction to Land Use Planning. (Same as PA 5601)  
 Geog 8344. Seminar: Public Land Policy in Minnesota.  
 Geog 8345. Seminar: Public Land Policy in Minnesota.  
 Geog 8420. Seminar: Climatology.

### GEOLOGY AND GEOPHYSICS (Geo)

Newton Horace Winchell School of Earth Sciences Institute of Technology

106 Pillsbury Hall, 624-1333

H.O. Pfannkuch, 2D Pillsbury Hall, 624-1620

- Geo 1001. The Dynamic Earth: An Introduction to Geology.  
 Geo 1003. Introduction to the Mesozoic: Evolution, Ecology and Extinction of Dinosaurs.  
 Geo 1004. Physical and Historical Geology of Minnesota.  
 Geo 1011. Volcanoes of the Earth.  
 Geo 1012. Planet Earth.  
 Geo 1019. Our Changing Planet.  
 Geo 1021. Introduction to Geology Lab: Geology of Minnesota.  
 Geo 1031. Earth System Science from the Perspective of Minnesota Geology.  
 Geo 1601. Oceanography.  
 Geo 1701. Faces of the Earth.  
 Geo 3001. Earth Materials.  
 Geo 3002. Climate Change and Human History.  
 Geo 3003. Geohazards.  
 Geo 3004. Human Geomorphology.  
 Geo 3005. Earth Resources.  
 Geo 3006. Water and Society.  
 Geo 3007. Planets of the Solar System.  
 Geo 3201. Geodynamics I: The Solid Earth.  
 Geo 3202. Geodynamics II: The Fluid Earth.  
 Geo 3211. Honors Earth Science.  
 Geo 3301. Geochemical Principles.  
 Geo 3402. Introductory Mineralogy.  
 Geo 3402. Petrology.  
 Geo 5004. Mineralogy.  
 Geo 5108. Advanced Environmental Geology.  
 Geo 5201. Structural Geology.  
 Geo 5251. Geomorphology.  
 Geo 5261. Glacial Geology.  
 Geo 5311. General Geochemistry.

- Geo 5313. Aqueous Geochemistry.
- Geo 5601. Limnology.
- Geo 5641. General and Physical Hydrogeology.
- Geo 5642. Quantitative Hydrogeology.
- Geo 5643. Chemical Hydrogeology.
- Geo 8262. Quaternary Paleocology and Climate.
- Geo 8602. Advanced Limnology.
- Geo 8612. Analytical Geohydrology.
- Geo 8617. Transport Phenomena in Natural Porous Media.

### **HISTORY OF MEDICINE (HMed)**

*Medical School*

*510 Diehl Hall, 624-4416*

*Leonard G. Wilson, Box 506 Mayo, 624-4416*

- HMed 3040. Human Disease and the Environment in History.

### **HISTORY OF SCIENCE AND TECHNOLOGY (HSci)**

*Institute of Technology*

*Arthur Norberg, 4-213 Electrical Engineering/Computer Science,  
625-1067*

- HSci 3331/5331. Technology in American Culture.
- HSci 5244. History of Ecology and Environmentalism.

### **HONORS SEMINAR**

*College of Liberal Arts*

*115 Johnston Hall*

*Ann Minnick, 624-6036*

- HSem 3030. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as CE 5099, Mgmt 5101, PA 5793, PubH 5150*)

### **HORTICULTURAL SCIENCE (Hort)**

*College of Agricultural, Food, and Environmental Sciences*

*305 Alderman Hall, 624-5300*

*Evonne Kuyper, 305 Alderman Hall, 624-4242*

- Hort 1010. Home Horticulture.

- Hort 1021. Woody Plant Materials.
- Hort 1022. Herbaceous Plant Materials.
- Hort 1023. Indoor Plants and Landscapes.
- Hort 1036. Plant Propagation.
- Hort 3001. Growth Regulation of Horticultural Plants.
- Hort 3002. Horticultural Cropping Systems.
- Hort 3003. Plant Genetics and Improvement.
- Hort 3004. Applications of Plant Biotechnology.
- Hort 3010. Growing Plants Organically: What It Means To Be "Green."
- Hort 3030. Landscape Design of Residential and Small Commercial Sites.
- Hort 3040. Landscape Design and Implementation.
- Hort 3072. Turf Management.
- Hort 5001. Harvest to Market of Horticultural Crops.
- Hort 5015. Restoration and Reclamation Ecology.
- Hort 5020. Topics in Plant Science for Teachers.
- Hort 5026. Landscape Management.
- Hort 5031. Temperate Fruit Production.
- Hort 5034. Commercial Vegetable Agriculture.
- Hort 5040. Plant Growth Regulation.
- Hort 5042. Turf Grass Science.
- Hort 5046. Nursery Management I.
- Hort 5047. Nursery Scheduling and Enterprise Development.
- Hort 5048. Nursery Management II.
- Hort 5054. Commercial Floriculture Production Practices.
- Hort 5055. Commercial Floriculture Production Systems.
- Hort 8023. Evolution of Crop Plants.
- Hort 8045. Plant Response to Environmental Stress.

### **INTER-COLLEGE PROGRAM (UC)**

*University College*

*107 Armory, 624-2022*

*Susan Stonefield, 107 Armory, 624-2004*

- UC 3075. Directed Study.

**INTERDEPARTMENTAL STUDY (ID)***College of Liberal Arts**220 Johnston Hall, 624-7577**Lisa Murphy, 220 Johnston Hall, 624-7577*

ID 3970. Directed Studies.

ID 5525-5526. Garbage, Government, and the Globe.

**INTERNATIONAL RELATIONS (IntR)***College of Liberal Arts**214 Social Sciences, 624-9007**Karlyn Eckman, 110 Green Hall, 624-3400 or 649-1606*

IntR 3900. Topics in International Relations: Development Assistance Programs.

IntR 3900. Topics in International Relations: The Ecology of Development.

IntR 3900. Topics in International Relations: Environment and Development in the Third World.

IntR 3900. Topics in International Relations: Natural Resource and Environmental Policy in the Third World.

**LANDSCAPE ARCHITECTURE (LA)***College of Architecture and Landscape Architecture**125 Architecture, 625-6860**John Koepke, 125 Architecture, 625-6068*

LA 1401. The Designed Environment.

LA 3413. History of Landscape Architecture.

LA 5202. Landscape Ecology.

LA 5211. Making Landscape Space.

LA 5212. Ecological Informants of Design.

LA 5222. Planted Form: Ecological Principles/Land Use Concepts and Implementation of Planting Designs.

LA 5431. History of Landscape Architecture: Individual Influences.

LA 5562. Introduction to Geographical Information Systems.

LA 5571. Landscape Construction: Landform Systems.

LA 5572. Landscape Construction: Spatial Performance.

LA 8222. The Landscape Architectural Design of Community Places.

LA 8223. Regional Landscape Design.

LA 8231. Urban Landscape Design.

LA 8232. Design of Recreational Landscapes.

LA 8574. Landscape Construction: Mechanical Systems.

LA 8801. Concepts of Landscape Evaluation.

LA 8802. Perception Manipulation in Design of Exterior Space.

LA 8803. The Sublime, the Beautiful and the Picturesque: Theory and Practice.

LA 8804. Landscape Ecology and Design.

**LAW SCHOOL (Law)***285 Law Building, 625-1000**Daniel Farber, 350 Law Building, 625-1022*

Law 5215. Environmental Law.

Law 5885. Advanced Environmental Law.

**LIBERAL STUDIES (LS)***Extension Classes**306 Wesbrook Hall, 625-5098**Jennifer Lundblad, 306 Wesbrook Hall, 626-8348*

LS 5610. Environmental Ethics, Politics, and Public Policy.

**MECHANICAL ENGINEERING (ME)***Institute of Technology**125 Mechanical Engineering, 625-0705**Peter H. McMurry, 130 Mechanical Engineering, 625-3345*

ME 5603. Thermal Environmental Engineering.

ME 5604. Heating and Cooling Loads in Buildings.

ME 5605. Refrigeration and Air Conditioning Systems.

ME 5609. Air Pollution.

ME 5610. Air Pollution Control.

ME 5613. Principles of Particle Technology.

ME 5614. Principles of Particle Technology.

ME 5616. Aerosol Measurement.

ME 5617. Advanced Aerosol Measurement.

ME 5620. Clean Room Technology and Particle Monitoring.

ME 5630. Thermal Environmental Engineering Senior Laboratory.

ME 5712. Solar Energy Utilization.

ME 8613. Fundamentals of Aerosol Behavior.

**MICROBIOLOGY (MicB)**

*College of Biological Sciences,  
College of Liberal Arts, and Medical School,  
1460 Mayo Memorial Building, 624-6190  
Palmer Rogers, 925 Mayo Memorial Building, 624-7140*

- MicB 3103. General Microbiology.
- MicB 5105. Biology of Microorganisms.
- MicB 5309. Biocatalysis and Biodegradation. (*Same as BioC 5309*)
- MicB 5352. Applied Microbiology.
- MicB 5611. Microbial Ecology.

**NATURAL RESOURCES AND ENVIRONMENTAL STUDIES (NRES)**

*College of Natural Resources  
John V. Bell, 135 Natural Resources Administration Building, 624-6768*

- NRES 1001. Orientation to Natural Resources and Environmental Studies.
- NRES 1020. Information Technology in Natural Resources.
- NRES 1040. Natural Resources as Raw Materials.
- NRES 1201. Conservation of Natural Resources.
- NRES 3001. Colloquium in Natural Resources and Environmental Studies.
- NRES 3010. Ethics and Values in Resource Management.
- NRES 3020. Plant Resource Management and the Environment.
- NRES 3050. Experience and Training in a Field Setting.
- NRES 3060/5060. Water Quality in Natural Resource Management.
- NRES 3070. From Local to Global Ecology.
- NRES 3100. Conservation of Biodiversity.
- NRES 3201. Field Assessment Techniques.
- NRES 3202. Leadership and Management Skills Development.
- NRES 3225. NRES Directed Study Experience.
- NRES 5001. Colloquium in Natural Resources and Environmental Studies.
- NRES 5020. Plant Resource Management and the Environment.
- NRES 5060. Water Quality in Natural Resource Management.
- NRES 5100. Problem Solving in Natural Resources and Environmental Studies.
- NRES 5101. Integrated Natural Resource Management.
- NRES 5102. GIS for Problem Solving in Environmental Science and Management.

- NRES 5210. Survey, Measurement, and Modeling Methods for Natural Resources I.
- NRES 5220. Survey Measurement and Modeling Methods for Natural Resources II.
- NRES 5225. NRES Directed Study Experience.
- NRES 5240. Natural Resources Policy and Administration.
- NRES 5242. Management of Natural Resources Conflict.
- NRES 5245. Fundamentals of Landscape Planning for Recreation.
- NRES 5260. Economics and Natural Resources Management.
- NRES 5575. Wetlands Conservation.
- NRES 5703. Agroforestry: Role in Watershed Management.
- NRES 5800. Natural Resources Interpretation and Communication.

**PHILOSOPHY (Phil)**

*College of Liberal Arts  
355 Ford Hall  
C. Kenneth Waters, 385 Ford Hall, 625-4325*

- Phil 5607. Philosophy of Biology.
- Phil 8620. Seminar: Philosophy of Biology.

**PHYSICS (Phys)**

*Institute of Technology  
148 Physics, 624-7375  
Kenneth Keller, 148 Physics, 624-7314*

- Phys 5461. Physics and Chemistry of the Earth's Upper Atmosphere.

**PLANT BIOLOGY (PBio)**

*College of Biological Sciences  
220 Biological Sciences Center, 625-1234  
Kathleen Peterson, 223 Snyder Hall, 624-9417*

- PBio 1009. Minnesota Plant Life.
- PBio 1012. Plants Useful to Humans.
- PBio 3131. Survey of Plant Physiology.
- PBio 3201. Introductory Plant Systematics.
- PBio 5231. Introduction to the Algae.
- PBio 5801. Plants and Boreal Flora.

**PLANT PATHOLOGY (PIPa)**

*College of Agricultural, Food, and Environmental Sciences*  
 495 Borlaug Hall, 625-8200  
 Delores Huebner, 495 Borlaug Hall, 625-8200;  
 delores@puccini.crl.umn.edu

- PIPa 1001. The Good, Bad and Ugly Effects of Microorganisms on Plants and Human Society.
- PIPa 1002. Plant Diseases and Your Garden.
- PIPa 1003. Diseases of Trees.
- PIPa 1004. Diseases of Turfgrass.
- PIPa 3001. Management and Control of Field Crop Diseases.
- PIPa 3002. Management of Horticultural Crop Diseases.
- PIPa 3004. Air Pollution, People and Plants.
- PIPa 5102. Ecology of Fungi.
- PIPa 5201. Biology of Plant Diseases.
- PIPa 5203. Physiological and Molecular Plant-Microbe Interactions.
- PIPa 5204. Field Plant Pathology.
- PIPa 5206. Biology of Fungi.
- PIPa 5212. Diseases of Forest and Shade Trees.
- PIPa 5213. Plant Nematology.
- PIPa 5214. Plant Virology.
- PIPa 5500. Epidemiology and Ecology of Plant Disease.

**POLITICAL SCIENCE (Pol)**

*College of Liberal Arts*  
 1414 Social Sciences, 624-4144  
 Martin Sampson, 1414 Social Sciences, 624-4144

- Pol 3872/5872. International Organizations and the Environment.
- Pol 5410. Advanced Topics in Government and Politics: Politics of Environmental Movements.
- Pol 5523. The Politics of the Regulatory Process.

**PUBLIC AFFAIRS (PA)**

*Hubert H. Humphrey Institute of Public Affairs*  
 300 Humphrey Center, 625-9505  
 Sandra O. Archibald, 255 Humphrey Center, 625-3533

- PA 5251. Environmental Planning.
- PA 5601. Land Use. (*Same as Geog 5601*)
- PA 5622. Managing Urban Growth and Change.
- PA 5701. Science and State I.
- PA 5711. Energy Policy.
- PA 5713. Energy Regulation: Analysis and Advocacy.
- PA 5721. Environmental Policy.
- PA 5731. Technology Policy.
- PA 5732. Science, Technology and International Affairs.
- PA 5741. Economics of Environmental and Resource Policy.
- PA 5793. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as CE 5099, HSem 3030, Mgmt 5101, PubH 5150*)
- PA 5794. Nuclear Power: Friend or Foe.
- PA 5892. Strategies for Sustainable Development.
- PA 879x. Workshop/Seminar: Advanced Topics in Technology, Energy, and Environmental Policy.

**RECREATION, PARK, AND LEISURE STUDIES (Rec)**

*College of Education and Human Development*  
 209 Cooke Hall, 625-5300  
 Leo H. McAvoy, 203 Cooke Hall, 625-5887

- Rec 5160. Recreation Land Policy.
- Rec 5250. Financing Leisure Services.
- Rec 5310. Programming Outdoor and Environmental Education.
- Rec 5350. Wilderness Outdoor Recreation Programming.

**RHETORIC (Rhet)**

*College of Agricultural, Food, and Environmental Sciences*  
 201 Haecker Hall, 624-3445  
 Thomas Scanlan, 305 Haecker Hall, 624-1262;  
 scanl001@tc.umn.edu

- Rhet 1310. Humanities: The Land in American Experience.
- Rhet 3375. Humanities: Agricultural Heritage.
- Rhet 3395. In Search of Nature.

**SCIENCE IN AGRICULTURE (ScAg)**

*College of Agricultural, Food, and Environmental Sciences*  
 439 Borlaug Hall, 625-1244  
 Michael J. Sadowsky, 439 Borland Hall, 624-2706

- ScAg 1500. Biotechnology: Basic Concepts and Applications.

**SOCIOLOGY (Soc)**

*College of Liberal Arts*  
 909 Social Sciences, 624-4300  
 Katherine Frank, 909 Social Sciences, 624-7326

- Soc 3551. World Population Problems.
- Soc 5305. Environmental Sociology.

**SOIL, WATER, AND CLIMATE (Soil)**

*College of Agricultural, Food, and Environmental Sciences*  
 439 Borlaug Hall, 625-1244  
 Terence H. Cooper, 439 Borlaug Hall, 625-7747

- Soil 1020. The Soil Resource.
- Soil 1425. Introduction to Meteorology.
- Soil 3125. Basic Soil Science.
- Soil 3220. Soil Conservation and Land Use Management.
- Soil 3416. Plant Nutrients in the Environment.
- Soil 5020. Environmental Impact Assessment.
- Soil 5100. Problem Solving for Environmental Science.
- Soil 5210. Environmental Biophysics.
- Soil 5232. Soil Physics.
- Soil 5241. Microclimatology (Soils).

- Soil 5310. Soil Chemistry.
- Soil 5424. Applied Climatology.
- Soil 5510. Field Study of Soils.
- Soil 5550. Peatlands: Formation, Classification, and Utilization.
- Soil 5555. Wetland Soils.
- Soil 5600. Principles of Waste Management.
- Soil 5605. Microbial Ecology.
- Soil 5610. Soil Biology.
- Soil 8250. Advanced Soil Physics.

**STRATEGIC MANAGEMENT AND ORGANIZATION (BGS, Mgmt)**

*Carlson School of Management*  
 835 Management and Economics, 624-5232  
 A. Marcus, 871 Management and Economics, 624-2812

- BGS 3003. Business and the Natural Environment.
- BGS 3019/H3019. Topics in Business, Government and Society.
- BGS 8019. Topics in Business and Society.
- Mgmt 5101. Sec. 1. Preventing Pollution: Innovative Approaches to Environmental Management. (*Same as CE 5099, HSem 3030, PA 5793, PubH 5150*)
- Mgmt 5101. Sec. 2. Solid Waste Management Policy and Administration.

**SUSTAINABLE AGRICULTURE SYSTEMS (SAgr)**

*College of Agricultural, Food, and Environmental Sciences*  
 Craig Shaeffer, 411 Hayes Hall, 625-7224

- SAgr 8010. Colloquium in Sustainable Agriculture.
- SAgr 8020. Field Experiences in Sustainable Agriculture.

**WATER RESOURCES SCIENCE (WRS)**

*Graduate School*  
 Room 302, 1518 Cleveland Ave N  
 Patrick Brezonik, 624-9282;  
 brezo001@tc.umn.edu

- WRS 5010. Introduction into Field Research in Water Resources.
- WRS 5101. Water Resources: Individuals and Institutions.
- WRS 8100. Interdisciplinary Seminar in Water Resources.

### III. SPECIAL ACADEMIC PROGRAMS

#### INTERDISCIPLINARY ACADEMIC PROGRAMS

Majors, Minors, and Concentrations for Bachelor's, Master's, and Doctoral Degrees

#### AGRICULTURE

*College of Agricultural, Food, and Environmental Sciences*  
Karl Lorenz, 277 Coffey Hall, 624-9299

***B.S. with Minor in Sustainable Agriculture***

#### CENTER FOR ENVIRONMENTAL LEARNING AND LEADERSHIP (CELL)

*College of Education and Human Development, College of Natural Resources,*  
*Minnesota Extension Service*

William Cunningham, 1518 Cleveland Ave N, St. Paul Campus, 625-8153

***M.Ed. starting 1997, M.S. starting 1998***

#### CONSERVATION BIOLOGY

*Ecology, Evolution, and Behavior, College of Biological Sciences*  
Donald Siniff, 100 Ecology, 624-6743

***M.S. and Ph.D.***

#### ECOLOGY, EVOLUTION, AND BEHAVIOR

*College of Biological Sciences*  
Patrice Morrow, 100 Ecology, 625-5709

***B.S., M.S. and Ph.D.***

#### ENVIRONMENTAL DESIGN

*Landscape Architecture, College of Architecture and Landscape Architecture*  
Roger Martin, 125 Architecture Building, 625-6860

***B.E.D.***

*Graduate School*

Roger Martin, 125 Architecture Building, 625-6860

***M.L.A.***

#### ENVIRONMENTAL HEALTH

*Division of Environmental and Occupation Health, School of Public Health*

Jack S. Mandel, Head; Donald Vesley, Major Chair

Kathleen Soupir, Student Coordinator; Box 807 UMHC, 626-0900

***M.P.H.***

*Graduate School*

Jack S. Mandel, Head; Donald Vesley, Major Chair

Kathleen Soupir, Student Coordinator; Box 807 UMHC, 626-0900

***M.S. and Ph.D.***

#### ENVIRONMENTAL SCIENCE

*College of Agriculture, Food, and Environmental Sciences*

Terry Cooper, 439 Borlaug Hall, 625-7747

***B.S.***

#### MICROBIAL ECOLOGY

*Graduate School*

Michael Sadowsky, 439 Borlaug Hall, 624-2706

***Minor for M.S. and Ph.D.***

#### NATURAL RESOURCES AND ENVIRONMENTAL STUDIES

*College of Natural Resources and College of Agriculture*

John V. Bell, 135 Natural Resources Administration Building, 624-6768

***B.S.***

#### PUBLIC AFFAIRS

*Hubert H. Humphrey Institute of Public Affairs*

Sandra O. Archibald, 255 Humphrey Center, 625-3533

***M.A. and M.P. with concentration in Technology, Energy, and Environmental Policy***

**SUSTAINABLE AGRICULTURE SYSTEMS**

*Graduate School*

*Craig Shaeffer, 411 Borlaug Hall, 625-7224*

*Minor for M.S. and Ph.D.*

**WATER RESOURCES SCIENCE**

*Graduate School*

*Patrick L. Brezonik, Water Resources Research Center, Suite 302,*

*1518 Cleveland Ave North, St Paul Campus, 624-9282 or 625-0866*

*M.S., Ph.D. and Minor for M.S. and Ph.D.*

**WILDLIFE CONSERVATION**

*Fisheries and Wildlife, College of Natural Resources*

*James Kitts, 200 Hodson Hall, 624-3600*

*M.S., Ph.D., and Minor*

**Certificate Program**

**SOLID WASTE MANAGEMENT CERTIFICATE PROGRAM**

*Continuing Education and Extension/University College*

*Jennifer P. Lundblad, 202 Wesbrook Hall, 626-8348*

*M.S., Ph.D., and Minor*

**ALTERNATIVE WAYS TO EARN ACADEMIC CREDIT**

**EXTENSION CLASSES**

*University College*

*Directed Studies and Directed Research*

*314 Nolte Center for Continuing Education, 625-2500*

*Research Explorations (REX)*

*202 Wesbrook Hall, 626-0214 or 624-5092*

*Science CentrUM*

*202 Wesbrook Hall, 624-5092*

**GLOBAL CAMPUS**

*Institute of International Studies and Programs*

*102 Nicholson Hall, 625-3379*

*Ecology of the Rainforest in Costa Rica*

*Monteverde Institute Costa Rica*

*Marine Biology and Ecology*

*Denmark's International Study Program (DiS)*

*Minnesota Studies in International Development (MSID)*

*The Global Environment: Issues, Perspective, Experience*

*Practical Agricultural Reciprocal Training (PART) International*

*Multiple sites in most European countries plus Brazil and New Zealand*

**INDEPENDENT AND DISTANCE LEARNING**

*University College*

*Deborah Hillengass, 45 Wesbrook Hall, 624-2896;*

*dhilleng@mail.cee.umn.edu*

**UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAM (UROP)**

*Office of Vice President for Arts, Sciences, and Engineering*

*Vicki Munro, 12 Morrill Hall, 625-3853*

**INDIVIDUALIZED PROGRAMS**

*Many special learning opportunities are available in various University colleges. In addition, the following programs offer opportunities in which students can design their own environmental studies major.*

**INTER-COLLEGE PROGRAM**

*University College*

*107 Armory, 624-2004*

**OFFICE FOR SPECIAL LEARNING OPPORTUNITIES (OSLO)**

*College of Liberal Arts*

*220 Johnston Hall, 624-7577*

**PROGRAM FOR INDIVIDUALIZED LEARNING**

*University College*

*107 Armory, 624-4020.*



## IV. CENTERS

### AVIAN RESEARCH CENTER

*Veterinary PathoBiology*

*David Halvorson, Director, 301 Veterinary Science,  
1971 Commonwealth Ave, St. Paul, MN 55108*

*Phone: 612/625-1248; URL: <http://www.avian.umn.edu/>*

### BELL MUSEUM OF NATURAL HISTORY

*College of Biological Sciences*

*Scott Lanyon, Director, 10 Church Street SE, Minneapolis, MN 55455*

*Phone: 612/624-4112*

### CENTER FOR INTEGRATED NATURAL RESOURCES AND AGRICULTURAL MANAGEMENT

*College of Agricultural, Food, and Environmental Sciences and  
College of Natural Resources*

*Donald Wyse and Kenneth Brooks, Co-Directors, 107 Green Hall,  
1530 Cleveland Ave, St. Paul, MN 55108*

*Phone: 612/624-7418*

### CENTER FOR INTERNATIONAL FOOD AND AGRICULTURAL POLICY

*Department of Applied Economics, College of Agriculture, Food,  
and Environmental Sciences*

*Ben H. Senauer, Director, 332 Classroom Office Building,  
1994 Buford Ave, St. Paul, MN 55108*

*Phone: 612/625-8713*

### CENTER FOR POPULATION ANALYSIS AND POLICY

*Hubert H. Humphrey Institute of Public Affairs*

*Sanders D. Korenman, 267 HHH Center, 301 19th Ave S, Minneapolis,  
MN 55455*

*Phone: 612/625-0128; E-mail: [koren001@tc.umn.edu](mailto:koren001@tc.umn.edu)*

### CENTER FOR TRANSPORTATION STUDIES

*Gerard McCullough, Director*

*200 Transportation and Safety Building, 511 Washington Ave SE,  
Minneapolis, MN 55455*

*Phone: 612/626-1077, Fax: 612/625-6381*

### CENTER FOR URBAN AND REGIONAL AFFAIRS (CURA)

*Thomas M. Scott, Director*

*330 HHH Center, 301 19th Ave S, Minneapolis, MN 55455*

*Phone: 612/625-1551, Fax: 612/626-0273, E-mail: [cura@tc.umn.edu](mailto:cura@tc.umn.edu)*

*URL: <http://www.umn.edu/cura>*

### DESIGN CENTER FOR AMERICAN URBAN LANDSCAPE

*College of Architecture and Landscape Architecture*

*William Morrish, Director, 1313 Fifth St SE, Suite 222, Minneapolis,  
MN 55414*

*Phone: 612/627-1850*

### INSTITUTE FOR SOCIAL, ECONOMIC AND ECOLOGICAL SUSTAINABILITY

*Institute of International Studies, College of Liberal Arts*

*Anne Kapuscinski, C/O MacArthur Interdisciplinary Program on Peace  
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