



# Environmental Studies

Environmental scientists work toward defining and solving environmental problems caused by the actions of human beings. Their interdisciplinary training is broad-based and encompasses the natural sciences, mathematics, economics, and the social sciences. Their primary ethical concern is human stewardship of the earth.

Students in the Environmental Studies program are concerned with both the technological problems and social aspects of environmental issues. Working in cooperation with the Center for Environmental, Earth and Space Studies, Economics, and Sociology, they may participate in applied research. Their interdisciplinary course work includes the study of scientific principles used in environmental problem solving, and the study of the impact of economics, politics, and other social systems on environmental policies and practices.

Because of the breadth of study necessary to prepare for upper division Environmental Studies courses, students are urged to declare in the major during their freshman or sophomore year.

At least 50 percent of credits in the major should be at 3000/4000 levels.

## Programs

- Environmental Studies, B.S. (Geohydrology Emphasis) *major*
- Environmental Studies, B.S. (Environmental Toxicology Emphasis) *major*
- Environmental Studies, B.S. (Environmental Policy and Planning Emphasis) *major*
- Environmental Studies, B.S. (Ecosystem Studies Emphasis) *major*
- Environmental Studies, B.S. (Outdoor Education Emphasis) *major*
- Environmental Studies, B.S. (Environmental Management Emphasis) *major*
- Environmental Studies, B.S. (Environmental Chemistry Emphasis) *major*
- Environmental Studies, B.S. (Environmental Engineering Science Emphasis) *major*
- Environmental Studies *minor*

## Career Directions

- Chemist
- Ecologist
- Engineering Technician
- Environmental Chemist
- Environmental Consultant
- Environmental Economist
- Environmental Engineer
- Environmental Engineering Scientist
- Environmental Manager
- Environmental Outdoor Educator
- Environmental Policy Maker and Planner
- Environmental Scientist
- Environmental Sociologist
- Environmental Specialist
- Environmental Technologist
- Environmental Toxicologist
- Geohydrologist
- Hydrogeologist
- Natural Resources Specialist
- Pollution Control Specialist
- Research Lab Technician
- Researcher
- Teacher
- Wastewater Monitor
- Wastewater Treatment Operator
- Water Quality Specialist
- Water Treatment Operator
- Also: Graduate Study

## Preparation

### Recommended High School Courses

- Biology
- Chemistry
- Government
- Math
- Physics
- Political Science
- Social Science

## Environmental Studies, B.S. *major* Geohydrology Emphasis

Required Credits: 84  
Required GPA: 2.25

### REQUIRED CORE COURSES

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

### COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

### COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE THE FOLLOWING COURSE:

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ENVR 4970 Internship (3 credits)
- ENVR 4990 Thesis (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

**GEOHYDROLOGY EMPHASIS**

COMPLETE THE FOLLOWING COURSES:

- ENVR 4050 Geochemistry (3 credits)
- GEOL 1120 Historical Geology (4 credits)
- GEOL 2110 Mineralogy and Petrology (4 credits)
- GEOL 3211 Environmental Hydrology (3 credits)
- GEOL 3212 Hydrogeology (3 credits)
- GEOL 3400 Glacial and Pleistocene Geology (3 credits)
- MATH 2471 Calculus I (5 credits)
- MATH 2472 Calculus II (5 credits)
- PHYS 1101 General Physics I (4 credits)

SELECT 2 SEMESTER CREDITS OF ELECTIVES APPROVED BY CEES ADVISOR:

**SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.**

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)  
MATH 2171 Concepts of Calculus I
  2. MATH 1470 Precalculus (5 credits)  
MATH 2471 Calculus I (5 credits)
- Liberal Education Requirements

Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)  
CHEM 1112 General Chemistry II
  2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

**Environmental Studies, B.S. *major***  
**Environmental Toxicology Emphasis**

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Required Credits: 86

Required GPA: 2.25

**I REQUIRED CORE COURSES**

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE THE FOLLOWING COURSE:

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ENVR 4970 Internship (3 credits)
- ENVR 4990 Thesis (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

### ENVIRONMENTAL TOXICOLOGY EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- CHEM 3311 Organic Chemistry I (3 credits)
- CHEM 3312 Organic Chemistry II (3 credits)
- CHEM 4411 Biochemistry I (3 credits)
- CHEM 4412 Biochemistry II (3 credits)
- ENVR 4400 Environmental Microbiology (3 credits)
- ENVR 4500 Environmental Toxicology (4 credits)
- PHYS 1101 General Physics I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- BIOL 3260 Medical Physiology (4 credits)
- BIOL 3720 Plant Form and Function (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 4101 Environmental Chemistry (3 credits)
- ENVR 4101 Environmental Chemistry (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- MATH2171
- MATH 2471 Calculus I (5 credits)

SELECT 3 SEMESTER CREDITS OF ELECTIVES APPROVED BY CEES ADVISOR:

### SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

#### Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)

- MATH 2171 Concepts of Calculus I
- 2. MATH 1470 Precalculus (5 credits)
- MATH 2471 Calculus I (5 credits)

- Liberal Education Requirements

#### Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)
  - CHEM 1112 General Chemistry II
  2. CHEM 2211 Principles of Chemistry I (4 credits)
  - CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

#### Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

#### Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

## Environmental Studies, B.S. *major* Environmental Policy and Planning Emphasis

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Required Credits: 75

Required GPA: 2.25

### I REQUIRED CORE COURSES

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

**COMPLETE THE FOLLOWING COURSE:**

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

**SELECT 1 OF THE FOLLOWING COURSES:**

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

**SELECT 1 OF THE FOLLOWING COURSES:**

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

**SELECT 1 OF THE FOLLOWING COURSES:**

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

**SELECT 1 OF THE FOLLOWING COURSES:**

- ENVR 4970 Internship (3 credits)
- ENVR 4990 Thesis (3 credits)

**SELECT 1 OF THE FOLLOWING COURSES:**

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

**ENVIRONMENTAL POLICY AND PLANNING EMPHASIS**

**COMPLETE THE FOLLOWING COURSES:**

- ECON 2000 Markets and Resource Allocation (3 credits)
- ECON 3230 Benefit/Cost Analysis (3 credits)
- ENVR 3600 Environmental Justice and Sustainability (3 credits)
- GEOG2231
- GEOG 2400 Introduction to Planning (3 credits)
- GEOG3310
- POL 1200 Introduction to American Politics (3 credits)
- POL 3200 Minnesota Politics (3 credits)
- POL 3210 Public Administration (3 credits)

**SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.**

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

**Freshman**

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)  
MATH 2171 Concepts of Calculus I
  2. MATH 1470 Precalculus (5 credits)  
MATH 2471 Calculus I (5 credits)
- Liberal Education Requirements

**Sophomore**

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)

- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)  
CHEM 1112 General Chemistry II
  2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

**Junior**

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

**Senior**

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

**Environmental Studies, B.S. *major***  
**Ecosystem Studies Emphasis**

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Required Credits: 84

Required GPA: 2.25

**I REQUIRED CORE COURSES**

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

**COMPLETE THE FOLLOWING COURSES:**

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

**COMPLETE THE FOLLOWING COURSE:**

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

**COMPLETE THE FOLLOWING COURSE:**

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

**SELECT 1 OF THE FOLLOWING COURSES:**

- CHEM 1111 General Chemistry I (4 credits)

- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ENVR 4970 Internship (3 credits)
- ENVR 4990 Thesis (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

### ECOSYSTEM STUDIES EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- BIOL 3361 Limnology I (4 credits)
- ENVR 3600 Environmental Justice and Sustainability (3 credits)
- ENVR 4400 Environmental Microbiology (3 credits)
- ENVR 4500 Environmental Toxicology (4 credits)
- GEOG 3231 Introduction to Geographic Information Systems (3 credits)
- PHYS 1101 General Physics I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- BIOL 3630 Conservation Biology (3 credits)
- GEOG 3630 Conservation Biology (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- BIOL 3840 Wetlands Ecology (3 credits)
- ENVR 3840 Wetlands Ecology (3 credits)

SELECT 9 SEMESTER CREDITS OF ELECTIVES APPROVED BY CEES ADVISOR:

### SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

#### Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)  
MATH 2171 Concepts of Calculus I
  2. MATH 1470 Precalculus (5 credits)  
MATH 2471 Calculus I (5 credits)
- Liberal Education Requirements

#### Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)  
CHEM 1112 General Chemistry II
  2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

#### Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

#### Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

## Environmental Studies, B.S. *major* Outdoor Education Emphasis

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Required Credits: 73

Required GPA: 2.25

### I REQUIRED CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

COMPLETE THE FOLLOWING COURSE:

- ENVR 4970 Internship (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)

- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

### OUTDOOR EDUCATION EMPHASIS

#### 1. REQUIRED CORE

COMPLETE THE FOLLOWING COURSES:

- ENVR 3600 Environmental Justice and Sustainability (3 credits)
- HLTH 3600 Emergency Response (3 credits)
- HLTH3660
- PHED 2925 People and the Environment: (3 credits)
- PHED 4360 Adventure Programming (3 credits)

#### 2. REQUIRED ELECTIVES

SELECT 4 SEMESTER CREDITS FROM THE FOLLOWING COURSES:

- PHED 1120 Introduction to Sea Kayaking (1 credit)
- PHED1160
- PHED 1180 Canoeing (1 credit)
- PHED 1200 Introduction To Rock Climbing (1 credit)
- PHED 1520 Downhill Skiing (1 credit)
- PHED 1554 Skills for Life: Cross Country Skiing (1 credit)

#### 3. GUIDED ELECTIVES

SELECT 8-9 SEMESTER CREDITS FROM BIOL, ED, GEOG AND GEOL COURSES APPROVED BY CEES ADVISOR:

### SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

#### Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- MATH 1170 College Algebra (4 credits)
- MATH 1470 Precalculus (5 credits)  
or MATH 2471 Calculus I (5 credits)
- Liberal Education requirements

#### Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:

1. CHEM 1111 General Chemistry I (4 credits)  
CHEM 1112 General Chemistry II (4 credits)
2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II (4 credits)

- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)  
or STAT 2610 Applied Statistics (4 credits)
- Liberal Education requirements

#### Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON 3040 Environmental Economics (3 credits)  
or ENVR 3040
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education requirements

#### Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)  
or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education requirements

## Environmental Studies, B.S. *major* Environmental Management Emphasis

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Required Credits: 89

Required GPA: 2.25

### I REQUIRED CORE COURSES

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE ONE OF THE FOLLOWING COURSES:

- ENVR 4970 Internship (3 credits)  
or ENVR 4990 Thesis (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

### ENVIRONMENTAL MANAGEMENT EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- ENVR 3300 Environmental Management and Safety (3 credits)
- ENVR 4200 Wastewater Treatment (3 credits)
- ENVR 4220 Sampling and Analysis (4 credits)
- ENVR 4230 Air Pollution Technology (4 credits)
- ENVR 4240 Waste Management (4 credits)
- ENVR 4260 Risk Assessment and Auditing (3 credits)
- TADT 4880 Total Quality Management (3 credits)
- TADT 4897 Project Management (4 credits)
- MATH 2471 Calculus I (5 credits)
- PHYS 1101 General Physics I (4 credits)

SELECT 4 SEMESTER CREDITS OF ELECTIVES APPROVED BY CEES ADVISOR:

### SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

#### Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)  
MATH 2171 Concepts of Calculus I
  2. MATH 1470 Precalculus (5 credits)  
MATH 2471 Calculus I (5 credits)
- Liberal Education Requirements

#### Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)  
CHEM 1112 General Chemistry II
  2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)

- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

#### Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

#### Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

## Environmental Studies, B.S. *major* Environmental Chemistry Emphasis

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Required Credits: 84

Required GPA: 2.25

### I REQUIRED CORE COURSES

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE THE FOLLOWING COURSE:

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ENVR 4970 Internship (3 credits)
- ENVR 4990 Thesis (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

### ENVIRONMENTAL CHEMISTRY EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- CHEM 3311 Organic Chemistry I (3 credits)
- CHEM 3312 Organic Chemistry II (3 credits)
- CHEM 3371 Organic Chemistry Laboratory I (1 credit)
- CHEM 3372 Organic Chemistry Laboratory II (1 credit)
- CHEM 3507 Analytical Chemistry (3 credits)
- CHEM 3570 Analytical Chemistry Laboratory (1 credit)
- ENVR 4220 Sampling and Analysis (4 credits)
- MATH 2471 Calculus I (5 credits)
- PHYS 1101 General Physics I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ENVR 4050 Geochemistry (3 credits)
- CHEM 4101 Environmental Chemistry (3 credits)
- ENVR 4101 Environmental Chemistry (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 4102 Environmental Chemistry II (3 credits)

SELECT 5 SEMESTER CREDITS OF ELECTIVES APPROVED BY CEES ADVISOR:

### SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

#### Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)  
MATH 2171 Concepts of Calculus I
  2. MATH 1470 Precalculus (5 credits)  
MATH 2471 Calculus I (5 credits)
- Liberal Education Requirements

#### Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)

- CHEM 1112 General Chemistry II
- 2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

#### Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

#### Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

## Environmental Studies, B.S. *major* Environmental Engineering Science Emphasis

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Required Credits: 88

Required GPA: 2.25

### I REQUIRED CORE COURSES

Note: Students who select the Environmental Management Emphasis should select ENVR 4970 Internship rather than ENVR 4990 Senior Thesis.

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- GEOL 1110 Physical Geology (4 credits)
- POL 3230 Environmental Politics (3 credits)
- SOC 3050 Environmental Sociology (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE THE FOLLOWING COURSE:

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:



- CHEM 1112 General Chemistry II (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ECON 3040 Environmental Economics (3 credits)
- ENVR 3040 Environmental Economics (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- ENVR 4970 Internship (3 credits)
- ENVR 4990 Thesis (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:

- SOC 3001 Social Statistics (3 credits)
- STAT 2610 Applied Statistics (4 credits)

### ENVIRONMENTAL ENGINEERING SCIENCE EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- ENVR 4200 Wastewater Treatment (3 credits)
- ENVR 4230 Air Pollution Technology (4 credits)
- ENVR 4240 Waste Management (4 credits)
- MATH 2471 Calculus I (5 credits)
- MATH 2472 Calculus II (5 credits)
- PHYS 2101 Physics I (5 credits)
- PHYS 2102 Physics II (5 credits)
- PHYS 2210 Statics and Strength of Materials (3 credits)
- PHYS 2220 Dynamics (3 credits)
- PHYS 3230 Fluid Mechanics (3 credits)

### SUGGESTED SEMESTER SCHEDULE FOR ENVIRONMENTAL STUDIES MAJOR, B.S.

The following is a list of Environmental Studies Major Courses arranged by year. This schedule is intended to help students plan their courses in an orderly fashion; however, these are only suggestions and this schedule is flexible.

#### Freshman

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- Select one mathematics sequence:
  1. MATH 1170 College Algebra (4 credits)  
MATH 2171 Concepts of Calculus I
  2. MATH 1470 Precalculus (5 credits)  
MATH 2471 Calculus I (5 credits)
- Liberal Education Requirements

#### Sophomore

- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)
- Select one chemistry sequence:
  1. CHEM 1111 General Chemistry I (4 credits)  
CHEM 1112 General Chemistry II
  2. CHEM 2211 Principles of Chemistry I (4 credits)  
CHEM 2212 Principles of Chemistry II
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
- SOC 3001 Social Statistics (3 credits)
- or STAT 2610 Applied Statistics (4 credits)
- Liberal Education Requirements

#### Junior

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)
- ENVR 4210 Environmental Law and Policy (3 credits)
- POL 3230 Environmental Politics (3 credits)
- ECON/ENVR 3040 Environmental Economics
- SOC 3050 Environmental Sociology (3 credits)
- Emphasis courses
- Liberal Education courses

#### Senior

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)
- ENVR 4970 Internship (3 credits)
- or ENVR 4990 Thesis (3 credits)
- Complete Emphasis courses
- Complete Liberal Education courses

## Environmental Studies *minor*

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Required Credits: 22

Required GPA: 2.00

### I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSES:

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- BIOL 2610 General Ecology (3 credits)
- ENVR 2000 Introduction to Environmental Science (3 credits)

COMPLETE THE FOLLOWING COURSE:

- ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)

COMPLETE THE FOLLOWING COURSE:

Enroll for 1 credit - two different terms

- ENVR 4920 Directed Group Study: Senior Seminar (1 credit)

### II REQUIRED ELECTIVES

SELECT 4 SEMESTER CREDITS IN UPPER DIVISION COURSES IN ENVIRONMENTAL STUDIES

## Environmental Studies Courses

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### ENVR 2000 Introduction to Environmental Science (3 credits)

An introduction to environmental science emphasizing biological, physical-chemical and cross-cultural environmental social principles underlying major world environmental, political and economic issues; examination of the impacts of human activities and technology on global environmental and socio-economic stability; application of critical thinking and working with graphic skills and lab-like data analysis related to global environmental, biological, physical-chemical, cultural, and socio-economic topics. Liberal Education Goal Areas 3 & 10.

**ENVR 2150 Wilderness Ethics: Projects for Environmental Field Programs (1-3 credits)**

Major schools of thought on the meaning of wilderness, its importance to modern society, and implications for responsible citizenship. Notions of wilderness and wilderness ethics advanced by major authors, past and present. Wilderness policy in the United States and recommendations for revisions to the Wilderness Act. Relation of sustainability to wilderness protection and the benefits provided to society. Experiential learning by visiting key areas that meet certain criteria for wilderness and relation of these experiences to personal values, including ethical behavior in "wilderness" settings. Liberal Education Goal Area 9.

**ENVR 2925 People and the Environment - The Global Pollution Perspective (3 credits)**

This course is a section of the interdisciplinary environmental issues course, People and the Environment. The focus of this course is to explore the scientific aspects of global pollution, including causes, effects, and solutions. Liberal Education Goal Area 10.

**ENVR 3040 Environmental Economics (3 credits)**

Examines environmental problems as consequence of market's failure to accurately value environmental resources. Alternative private and public policies are examined in terms of their effectiveness in improving the efficiency and equity with which water, air, and other resources are allocated. Prerequisite: ECON 2000 or consent of instructor. Also offered under ECON 3040.

**ENVR 3300 Environmental Management and Safety (3 credits)**

Helps students pursuing environmental studies to develop environmental management skills required in both manufacturing and non-manufacturing businesses. Safe handling, transport, and storage of hazardous materials with respect to their physical and chemical nature, and application of regulatory requirements relevant to specific business and hazardous materials involved. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor. May not be offered every year.

**ENVR 3600 Environmental Justice and Sustainability (3 credits)**

The ethical and moral dimensions of environmental choices. The legal, philosophical, political, and economic underpinnings of various theories of justice. A major focus is the inequitable distribution of environmental risks and the implications of policies that attempt to combat these risks. Prerequisite: ENVR 2000 or consent of instructor.

**ENVR 3840 Wetlands Ecology (3 credits)**

Survey course develops a basic understanding of the terminology, classification, ecology, values, and conservation of wetlands. Covers wetland systems from around the world, with emphasis on wetlands in North America. Prerequisites: BIOL 1211 and BIOL 1212.

**ENVR 3920 DGS: Seminar in Environmental Controversies (2 credits)**

When taken as Environmental Controversies Seminar, the following description applies: Faculty and student presentations followed by group discussion of classic and current problems, and governmental policies/regulations. Prerequisite: ENVR 2000 or consent of instructor.

**ENVR 4050 Geochemistry (3 credits)**

Study of processes in the lithosphere, hydrosphere, and atmosphere; cycling of the elements; weathering; microbe-mineral interactions; nanoparticles; microscopic imaging. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor.

**ENVR 4101 Environmental Chemistry (3 credits)**

Intensive study of biogeochemical cycles of natural and man-made pollutants including transformations, transport, fate and persistence mechanisms. Environmental effects, long-term impacts, and methods of treatment/prevention are discussed. Prerequisites: CHEM 1112 or CHEM 2212 or consent of instructor.

**ENVR 4102 Environmental Chemistry II (3 credits)**

Study of processes affecting behavior and fate of anthropogenic and natural compounds in the atmosphere, soils, and water. Colloidal and surface phenomena, nanoprocesses, redox reactions, speciation, solubility, and complexation. Prerequisite: ENVR/CHEM 4101; GEOL 1110; and ENVR 2000 or consent of instructor.

**ENVR 4200 Wastewater Treatment (3 credits)**

Introduction to the operation of the principal methods and treatment processes of municipal and industrial wastewaters, and for the disposal of treated effluent and sludges, and other solid materials. Integration of fundamental principles of science with different aspects of sanitary technology. Prerequisites: BIOL 1212, CHEM 1112 or CHEM 2212, MATH 1170, or consent of instructor. BIOL 1212 is not required for Chemistry majors.

**ENVR 4210 Environmental Law and Policy (3 credits)**

Overview of environmental laws, regulations, and policies. Prerequisite: Consent of instructor.

**ENVR 4220 Sampling and Analysis (4 credits)**

Methods of sampling and analysis of air, water, soil and other environmental compartments will be described in lecture and experienced in laboratory session. The focus is on regulations and prescribed protocols for environmental field and lab work. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor.

**ENVR 4230 Air Pollution Technology (4 credits)**

In depth overview of sources and types of air pollution, major environmental impacts, regulations, and technologies for control and clean up. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor.

**ENVR 4240 Waste Management (4 credits)**

An overview of the solid and hazardous waste situation at the local, state, national and international levels. The focus on management will include a systems approach to prevention, and remediation of wastes. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor.

**ENVR 4260 Risk Assessment and Auditing (3 credits)**

Overview of human/environmental risk assessment methods and environmental auditing techniques, with a focus on regulatory compliance and case studies. Prerequisites: CHEM 1112 or CHEM 2212 or ENVR 2000 or GEOL 1110 or consent of instructor.

**ENVR 4400 Environmental Microbiology (3 credits)**

Fundamental aspects of microbiology as related to land production, environmental pollution and water quality control processes. The role of major groups of microbes as pollutants, as purifying agents, and as agents of biochemical changes, and ecological functions and importance of each group in the environment. Prerequisites: BIOL 1110 or BIOL 1120 or CHEM 1112 or CHEM 2212 or consent of instructor.

**ENVR 4500 Environmental Toxicology (4 credits)**

An overview of major environmental pollutants, their transport, fate and toxicology. Pollutant effects studied from practical and theoretical focus on stress at various levels of biological organization. Prerequisites: BIOL 1212, BIOL 2610, and CHEM 1112 or CHEM 2212, or consent of instructor.

**ENVR 4920 Directed Group Study: Senior Seminar (1 credit)**

A series of 2 seminars (1 credit each) will explore 1) the environmental job market and graduate school opportunities (Fall), and 2) current environmental issues/literature (Spring). Prerequisites: Senior status; Environmental Studies major, and ENVR 3920.

**ENVR 4970 Internship (3 credits)**

Graded Satisfactory/Unsatisfactory only. Student internships may be either full-time or part-time in a public or private agency appropriate to the degree objective. Internships consist of closely supervised periods of service that are arranged in advance of the course registration. Students should consult their advisor concerning prerequisites.

**ENVR 4990 Thesis (3 credits)**

A thesis written by the student that reports extensive original research carried out by the student and demonstrates appropriate methodology and scholarship.

**All-University Courses**

The course numbers listed below, not always included in the semester class schedule, may be registered for by consent of the advisor, instructor, or department chair, or may be assigned by the department when warranted. Individual registration requires previous arrangement by the student and the completion of any required form or planning outline as well as any prerequisites.

1910, 2910, 3910, 4910 DIRECTED INDEPENDENT STUDY

1920, 2920, 3920, 4920 DIRECTED GROUP STUDY

1930, 2930, 3930, 4930 EXPERIMENTAL COURSE

1940, 2940, 3940, 4940 IN-SERVICE COURSE

1950, 2950, 3950, 4950 WORKSHOP, INSTITUTE, TOUR

1960, 2960, 3960, 4960 SPECIAL PURPOSE INSTRUCTION

1970, 2970, 3970, 4970 INTERNSHIP

1980, 2980, 3980, 4980 RESEARCH

1990, 2990, 3990, 4990 THESIS