Bachelor of Science degree with a major in Environmental Science & Management — with concentrations in:

Ecological Restoration
Energy & Climate
Environmental Education & Interpretation
Environmental Planning & Policy
Geospatial Science
Natural Resources

Minors
Ecological Restoration
Environmental Education & Interpretation
Environmental & Natural Resources Planning
Environmental Policy
Natural Resources
Natural Resources Recreation

Certificates of Study
Environmental Education & Interpretation
Environmental & Natural Resources Planning
Geospatial Science
Natural Resources Policy & Administration

Master of Science degree in Natural Resources — with a concentration in Environmental Science & Management

Department Chair
Steven R. Martin, Ph.D.

Environmental Science & Management
Natural Resources Building 200
707-826-4147
environment.humboldt.edu

Associated Faculty & Advisors
Natalie Arroyo, Gillian Black, Craig Benson, Kerry Byrne, Jeff Dunk, Yvonne Everett, Kevin Fingerman, James Graham, David Gwienzi, Jennifer Kaitl, Buddhika Madurapperuma, Nick Malloy, Jennifer Marlow, Steven Martin, Judith Mayer, Melanie McCavour, Jack Murphy, Alison O’Dowd, Jennifer Ortega, Laurie Richmond, Amy Rock, Roxann Schroeder, Jennifer Tarlton, William Trush, Julie Van Sickle, Casey Vaughn, Tashina Welliver

The Program

Students completing this program will have demonstrated:

- the ability to apply science to understanding ecosystems and natural resources
- the ability to understand the policy and social implications of environmental issues.

- the knowledge and skills to understand, analyze, address and manage the consequences of human actions on the physical, biological, and cultural world.
- the knowledge and skills to seek out the information and resources necessary to understand complex environmental issues.
- the writing, speaking, and electronic communication skills needed to communicate with the public and professionals concerning the environmental sciences.
- the ability to apply critical thinking skills as the basis for decision making and sound value judgments.

Graduates should find work with state, federal, and local governments, nonprofit conservation organizations, private sector consulting firms [particularly those dealing with environmental impact analysis, environmental planning, wetlands delineation, environmental restoration, geospatial applications in natural resources, energy technology and planning, and natural resource management], or go on to professional and graduate schools to study ecology, environmental law, environmental planning, human dimensions of natural resources, outdoor recreation management, geospatial science, natural resources management, wilderness management, public administration, or environmental policy.

Preparation

High school students need strong academic preparation in math, writing, and the sciences.

Requirements for the Major

For a description of degree requirements to be fulfilled in addition to those listed below for the major, please see “The Bachelor’s Degree” section of the catalog, pp. 67-82.

Unit Requirements

Core units: 24
Concentration units: 39-54
Total units in the major: 73-78
Total units required for the degree: 120

Special Grade Requirement

Complete all courses in the major with a grade of C- or better.

Core Courses [24 units]

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
<th>Description</th>
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<tbody>
<tr>
<td>ESM 105</td>
<td>3</td>
<td>Natural Resource Conservation</td>
</tr>
<tr>
<td>ESM 111</td>
<td>1</td>
<td>Environmental Science Seminar</td>
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<tr>
<td>GSP 101</td>
<td>2</td>
<td>Geospatial Concepts and</td>
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<tr>
<td>GSP 101L</td>
<td>1</td>
<td>Geospatial Concepts Lab</td>
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<tr>
<td>STAT 109</td>
<td>4</td>
<td>Introductory Biostatistics</td>
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<tr>
<td>ESM 230</td>
<td>3</td>
<td>Environmental Methods</td>
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<tr>
<td>ESM 303</td>
<td>4</td>
<td>Applied Natural History &amp; Ecology</td>
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<tr>
<td>ESM 305</td>
<td>3</td>
<td>Environmental Conflict Resolution</td>
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<tr>
<td>ESM 325</td>
<td>3</td>
<td>Environmental Law &amp; Regulation</td>
</tr>
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</table>

Concentrations

Complete one of the following concentrations to fulfill the requirements of the major:

Ecological Restoration

Concentration (47 units)

Lower Division

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>BIOL 105</td>
<td>4</td>
<td>Principles of Biology</td>
</tr>
<tr>
<td>BCT 105</td>
<td>4</td>
<td>General Botany</td>
</tr>
<tr>
<td>CHEM 107</td>
<td>4</td>
<td>Fundamentals of Chemistry</td>
</tr>
<tr>
<td>GSP 270</td>
<td>3</td>
<td>Geographic Information Science [GIS]</td>
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<tr>
<td>SOIL 260</td>
<td>3</td>
<td>Intro to Soil Science</td>
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</table>

Upper Division

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>BCT 350</td>
<td>4</td>
<td>Plant Taxonomy</td>
</tr>
<tr>
<td>ESM 355</td>
<td>3</td>
<td>Principles of Ecological Restoration</td>
</tr>
<tr>
<td>ESM 425</td>
<td>3</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ESM 435</td>
<td>2</td>
<td>Grant Writing</td>
</tr>
<tr>
<td>ESM 455</td>
<td>4</td>
<td>Applied Ecological Restoration</td>
</tr>
<tr>
<td>FOR 315</td>
<td>3</td>
<td>Forest Management and</td>
</tr>
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<td>FOR 431</td>
<td>3</td>
<td>Forest Restoration, or</td>
</tr>
<tr>
<td>RRS 306</td>
<td>3</td>
<td>Rangeland Resource Principles and</td>
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<tr>
<td>RRS 430</td>
<td>3</td>
<td>Wildland Restoration &amp; Development</td>
</tr>
<tr>
<td>WSHD 310</td>
<td>4</td>
<td>Hydrology &amp; Watershed Management</td>
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</tbody>
</table>

Complete one upper division course approved by your advisor; from BOT, ESM, FISH, FOR, GEOL, GSP, RRS, SOIL, WSHD, or WLD. [Prerequisites may be required for some courses, depending on choice.]

NOTE: 24 units may double-count toward GE requirements.

† Course requires one or more prerequisites that are not required elsewhere in the major.
### Energy & Climate Concentration (54 units)

#### Lower Division
- **BIOL 105** (4) Principles of Biology, or **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry * **
- **EDCD 104** (3) Contemporary Topics in Economics
- **MATH 105i** (3) Calculus for the Biological Sciences & Natural Resources
- **PHYX 106** (4) College Physics: Mechanics & Heat
- **PHYX 107** (4) College Physics: Electromagnetism & Modern Physics
- **SOIL 260** (3) Introduction to Soil Science
- **GEOL 109** (4)
- **BOT 105** (4) General Botany

**NOTE:** 24 units may double-count toward GE requirements.

#### Upper Division
- **EDCD 450** (4) Energy Economics & Climate Policy
- **ENGR 305** (3) Appropriate Technology
- **ENGR 371** (3) Energy Systems & Technology
- **ESM 370** (3) Energy, Technology & Society
- **ESM 411** (3) Energy & Climate Capstone
- **ESM 425** (3) Environmental Impact Assessment

**Complete two climate science courses:**
- **CHEM 370** (3) Earth System Chemistry
- **ODN 420i** (3) Oceans and Climate
- **WSHD 458** (3) Climate Change & Land Use

**Complete two tools courses:**
- **EDCD 423** (3) Environmental & Natural Resource Economics
- **EDCD 309B** (3) Environmental Communication
- **ESM 435** (2) Grant Proposal Writing
- **GSP 270** (3) Geographic Information Science (GIS)
- **GEDG 301** (3) International Environmental Issues & Globalization

**NOTE:** 24 units may double-count toward GE requirements.

### Environmental Education & Interpretation Concentration (48 units)

#### Lower Division
- **BIOL 105** (4) Principles of Biology, or **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry* **
- **EDCD 420i** (3) Interpretive Computer Graphics
- **CD 209** (3) Middle Childhood Development
- **ESM 350** (3) Fundamentals of Environmental Education & Interpretation
- **ESM 351** (1) Environmental Interpretation Field Trip
- **ESM 353** (3) Environmental Education & Interpretation Graphics
- **ESM 430** (3) NR Management in Protected Areas
- **ESM 435** (2) Grant Proposal Writing
- **ESM 440** (2) Managing Recreation Visitors & Interpretation
- **ESM 440L** (1) Managing Recreation Visitors Lab
- **ECON 104** (3) Contemporary Topics in Economics
- **CHEM 109 & CHEM 110** may be substituted for CHEM 107.

**Complete a skills course:**
- **EDCD 340** (3) Graphic Design
- **EDCD 356** (3) Museum & Gallery Practices
- **EDCD 309B** (3) Environmental Communication
- **EDCD 425** (3) Environmental Impact Assessment
- **GSP 270** (3) Geographic Information Science (GIS)
- **GSP 330** (3) Mobile Mapping
- **GSP 370** (3) Intermediate GIS
- **ECON 104** (3) Contemporary Topics in Economics

**NOTE:** 24 units may double-count toward GE requirements.

### Environmental Planning & Policy Concentration (45-47 units)

#### Lower Division
- **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry* **
- **EDCD 420i** (3) Interpretive Computer Graphics
- **ESM 210** (3) Public Land Use Policies & Management
- **GSP 270** (3) Geographic Information Science (GIS)
- **GSP 370** (3) Intermediate GIS
- **ECON 423** (3) Environmental & Natural Resource Economics
- **ECON 351** (3) Energy & Climate Change & Land Use

**Plus one upper division natural resources management course [3 units], approved by advisor, from FISH, FOR, ESM, RRS, SOIL, WSHD, WLDF.**

**NOTE:** 24 units may double-count toward GE requirements.

### Environmental & Natural Resources Recreation Concentration (45 units)

#### Lower Division
- **BIOL 105** (4) Principles of Biology, or **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry* **
- **EDCD 420i** (3) Interpretive Computer Graphics
- **ESM 210** (3) Public Land Use Policies & Management
- **ESM 215** (3) Natural Resources & Recreation
- **SOIL 260** (3) Intro to Soil Science
- **GSP 270** (3) Geographic Information Science (GIS)
- **FOR 374** (3) Wilderness Area Management
- **ESM 415** (3) Recreation & Park Planning (alternate years)

**Complete one skills course:**
- **ART 340** (3) Graphic Design
- **ART 356** (3) Museum & Gallery Practices
- **EDCD 309B** (3) Environmental Communication
- **EDCD 425** (3) Environmental Impact Assessment
- **GSP 270** (3) Geographic Information Science (GIS)
- **GSP 330** (3) Mobile Mapping
- **GSP 370** (3) Intermediate GIS

**NOTE:** 24 units may double-count toward GE requirements.

### Environmental Education & Interpretation Concentration (48 units)

#### Lower Division
- **BIOL 105** (4) Principles of Biology, or **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry* **
- **EDCD 420i** (3) Interpretive Computer Graphics
- **CD 209** (3) Middle Childhood Development
- **ESM 350** (3) Fundamentals of Environmental Education & Interpretation
- **ESM 351** (1) Environmental Interpretation Field Trip
- **ESM 353** (3) Environmental Education & Interpretation Graphics
- **ESM 430** (3) NR Management in Protected Areas
- **ESM 435** (2) Grant Proposal Writing
- **ESM 440** (2) Managing Recreation Visitors & Interpretation
- **ESM 440L** (1) Managing Recreation Visitors Lab
- **ECON 104** (3) Contemporary Topics in Economics
- **CHEM 109 & CHEM 110** may be substituted for CHEM 107.

**Complete a skills course:**
- **EDCD 340** (3) Graphic Design
- **EDCD 356** (3) Museum & Gallery Practices
- **EDCD 309B** (3) Environmental Communication
- **EDCD 425** (3) Environmental Impact Assessment
- **GSP 270** (3) Geographic Information Science (GIS)
- **GSP 330** (3) Mobile Mapping
- **GSP 370** (3) Intermediate GIS

**NOTE:** 24 units may double-count toward GE requirements.

### Environmental Planning & Policy Concentration (45-47 units)

#### Lower Division
- **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry* **
- **EDCD 420i** (3) Interpretive Computer Graphics
- **ESM 210** (3) Public Land Use Policies & Management
- **GSP 270** (3) Geographic Information Science (GIS)
- **ECON 423** (3) Environmental & Natural Resource Economics
- **ECON 351** (3) Energy & Climate Change & Land Use

**Plus one upper division natural resources management course [3 units], approved by advisor, from FISH, FOR, ESM, RRS, SOIL, WSHD, WLDF.**

**NOTE:** 24 units may double-count toward GE requirements.

### Environmental & Natural Resources Recreation Concentration (45 units)

#### Lower Division
- **BIOL 105** (4) Principles of Biology, or **BOT 105** (4) General Botany
- **CHEM 107** (4) Fundamentals of Chemistry* **
- **EDCD 420i** (3) Interpretive Computer Graphics
- **CD 209** (3) Middle Childhood Development
- **ESM 350** (3) Fundamentals of Environmental Education & Interpretation
- **ESM 351** (1) Environmental Interpretation Field Trip
- **ESM 353** (3) Environmental Education & Interpretation Graphics
- **ESM 430** (3) NR Management in Protected Areas
- **ESM 435** (2) Grant Proposal Writing
- **ESM 440** (2) Managing Recreation Visitors & Interpretation
- **ESM 440L** (1) Managing Recreation Visitors Lab
- **ECON 104** (3) Contemporary Topics in Economics
- **CHEM 109 & CHEM 110** may be substituted for CHEM 107.

**Complete a skills course:**
- **EDCD 340** (3) Graphic Design
- **EDCD 356** (3) Museum & Gallery Practices
- **EDCD 309B** (3) Environmental Communication
- **EDCD 425** (3) Environmental Impact Assessment
- **GSP 270** (3) Geographic Information Science (GIS)
- **GSP 330** (3) Mobile Mapping
- **GSP 370** (3) Intermediate GIS

**NOTE:** 24 units may double-count toward GE requirements.
Complete one ecology & management course:

ESM 370  [3] Energy Technology & Society
ESM 420  [3] Ecosystem Analysis
ESM 430  [3] Natural Resource Management in Protected Areas


FISH 476‡  [3] Ecology of Running Waters

WLDF 460‡  [3] Conservation Biology

Complete one natural resource science fundamentals course:

FOR 130  [3] Dendrology
SOIL 260  [3] Intro to Soil Science
BOT 350‡  [4] Plant Taxonomy


Complete two upper division policy and management courses, chosen from a list of approved courses provided by your advisor. From ENGR, FISH, FOR, GEOG, NAS, PHIL, PSCI, RRS, SOIL, WSHD, WLDF. (Prerequisites may be required for some courses, depending on choice.)

NOTE: 24 units may double-count toward GE requirements.

Geospatial Science Concentration (39 units)

Lower Division

GEOG 106  [3] Physical Geography
GSP 216  [3] Intro to Remote Sensing

Upper Division

GSP 316  [4] Cartography
GSP 370  [3] Intermediate GIS
GSP 418  [3] Geospatial Programming II, or


Complete one natural resources depth or course approved by advisor: minimum 3 units:

ESM 360  [3] Intro to Environmental Planning Methods
ESM 430  [3] Natural Resource Mgmt. in Protected Areas
FISH 300  [3] Intro to Fishery Biology
FOR 307  [3] California’s Forests & Woodlands

Complete two upper division policy and management courses, chosen from a list of approved courses provided by your advisor. From ENGR, FISH, FOR, GEOG, NAS, PHIL, PSCI, RRS, SOIL, WSHD, WLDF. (Prerequisites may be required for some courses, depending on choice.)

NOTE: 24 units may double-count toward GE requirements.

Environmental Policy Minor

Total units required for the minor: 18

ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods

Environmental Education & Interpretation Minor

Total units required for the minor: 19

GEOG 106  [3] Physical Geography
GEOG 107  [3] Introduction to Geology
ESM 105  [3] Natural Resources & Management
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental & Natural Resources Planning Minor

Total units required for the minor: 19-20

GEOG 106  [3] Physical Geography
ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental Education & Interpretation Minor

Total units required for the minor: 19

GEOG 106  [3] Physical Geography
GEOG 107  [3] Introduction to Geology
ESM 105  [3] Natural Resources & Management
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental & Natural Resources Planning Minor

Total units required for the minor: 19-20

GEOG 106  [3] Physical Geography
ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental Policy Minor

Total units required for the minor: 18-19

GEOG 106  [3] Physical Geography
GEOG 107  [3] Introduction to Geology
ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental Education & Interpretation Minor

Total units required for the minor: 19

GEOG 106  [3] Physical Geography
GEOG 107  [3] Introduction to Geology
ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental & Natural Resources Planning Minor

Total units required for the minor: 19-20

GEOG 106  [3] Physical Geography
ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation

Environmental Policy Minor

Total units required for the minor: 18-19

GEOG 106  [3] Physical Geography
GEOG 107  [3] Introduction to Geology
ESM 105  [3] Natural Resource Conservation
ESM 360  [3] Intro to Environmental Planning Methods
Plus two courses from the following:

ESM 325  [3] Environmental Law & Regulation
### Natural Resources Minor

**Total units required for the minor:** 19

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
<th>Description</th>
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<tbody>
<tr>
<td>BIOL 105</td>
<td>4</td>
<td>Principles of Biology</td>
</tr>
<tr>
<td>ESM 105</td>
<td>3</td>
<td>Natural Resource Conservation</td>
</tr>
<tr>
<td>SOIL 260</td>
<td>3</td>
<td>Introduction to Soil Science</td>
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</table>

At least three courses from the following (at least 6 units must be 300 or above):

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ESM 210</td>
<td>3</td>
<td>Public Land Use Policies &amp; Management</td>
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<tr>
<td>ESM 215</td>
<td>3</td>
<td>Natural Resources &amp; Recreation</td>
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<tr>
<td>ESM 365</td>
<td>3</td>
<td>Local Government Planning</td>
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<td>FISH 300</td>
<td>3</td>
<td>Introduction to Fishery Biology</td>
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<tr>
<td>FOR 315</td>
<td>3</td>
<td>Forest Management</td>
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<tr>
<td>FOR 374</td>
<td>3</td>
<td>Wilderness Area Mgmt.</td>
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<tr>
<td>OCN 301</td>
<td>3</td>
<td>Marine Ecosystems — Human Impact</td>
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<tr>
<td>OCN 304</td>
<td>3</td>
<td>Resources of the Sea</td>
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<td>RRS 306</td>
<td>3</td>
<td>Wildland Resource Principles</td>
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<td>WLDF 301</td>
<td>3</td>
<td>Principles of Wildlife Mgmt.</td>
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### Natural Resources Recreation Minor

**Total units required for the minor:** 17-18

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tr>
<td>ESM 210</td>
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<tr>
<td>ESM 215</td>
<td>3</td>
<td>Natural Resources &amp; Recreation</td>
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<tr>
<td>ESM 305</td>
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<td>Environmental Conflict Resolution, or</td>
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<tr>
<td>ESM 309B</td>
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<td>Environmental Communication</td>
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<tr>
<td>FOR 374</td>
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<td>Wilderness Area Mgmt.</td>
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<tr>
<td>ESM 415</td>
<td>3</td>
<td>Recreation &amp; Park Planning, or</td>
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<tr>
<td>ESM 440</td>
<td>2</td>
<td>Managing Recreation Visitors</td>
</tr>
<tr>
<td>ESM 430</td>
<td>3</td>
<td>NR Management in Protected Areas</td>
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