

Concentration Specific Prerequisite Guidance and Course Requirements

Students are encouraged to review the prerequisite guidance and course requirements for their Environment and Management concentration. Additional information is available at the NSOE website: [MEM](#) and [MF](#).

MANAGEMENT CONCENTRATIONS

Business and Environment (BE)

The Business and Environment (BE) management concentration requires prerequisite courses in calculus and statistics. All incoming students should complete their prerequisite courses prior to the start of the program. Students who matriculate with one required prerequisite deficiency should plan to complete the prerequisite course in their first year of study, preferably in the fall semester.

The following graduate courses are required and should be taken in the first academic year:

Fall semester:

1. ENVIRON 796: Financial Foundations for Environmental Managers: no prerequisite courses
2. ENVIRON 811: Business and Environment: gateway course for the BE concentration

Spring semester:

3. ENVIRON 782: Marketing for Environmental Professionals: no prerequisite courses
4. ENVIRON 831: Business Strategy for Sustainability: prerequisite course ENVIRON 811

Community Engagement and Environmental Justice (CEEJ)

The Community Engagement and Environmental Justice management concentration has required prerequisite courses in calculus and statistics. All incoming students should complete their prerequisite courses prior to the start of the program. Students who matriculate with one required prerequisite deficiency should plan to complete the prerequisite course in their first year of study, preferably in the fall semester.

Required Core Course:

- ENVIRON 755: Community Engagement in the Environmental Field (fall)– required gateway course

Complete at least one of the following courses:

- ENVIRON 506: Environmental Justice: Theory and Practice (fall)
- ENVIRON 790: Environmental Justice/Dilemma (spring)
- ENVIRON 860SA: Political Ecology (typically taught in the fall at the Duke Marine Lab (DUML))

Complete at least one of the following courses:

- ENVIRON 528SA: Community-Based Marine Conservation in the Gulf of California (typically taught in spring at DUML)
- ENVIRON 795: Practicum in Community Engagement in the Environmental Field: typically taught in the spring semester; prerequisite course ENVIRON 755 (fall)
- ENV 869: Environmental Law and Policy Clinic (fall and spring)

If students have **not** already **completed 12 credits** of coursework from the list above, they may select one of the following courses to meet concentration requirements. **Note: Not all classes are offered on a regular basis/each semester – see the current course schedule.**

- ENVIRON 556: Environmental Conflict Resolution
- ENVIRON 557: Social Science Surveys for Environmental Management
- ENVIRON 590: Evaluating Environmental Programs

- ENVIRON 590: Indigenous Land & Water
- ENVIRON 590S: Narrating Nature Documentary and Environmental Studies
- ENVIRON 632: Environmental Education and Interpretation
- ENVIRON 658/A: Applied Qualitative Research Methods
- ENVIRON 705A: Social Impact Analysis
- ENVIRON 754A: Research Design for Environmental Social Sciences
- ENVIRON 820S: Conservation Ethics
- ENVIRON 887/A: Theory and Methods for Policy Analysis of the Commons

Environmental Analytics and Modeling (EAM)

The Environmental Analytics and Modeling (EAM) management concentration has required prerequisite courses in calculus and statistics. All incoming students should complete their prerequisite courses prior to the start of the program. Students who matriculate with one required prerequisite deficiency should plan to complete the prerequisite course in their first year of study, preferably in the fall semester.

The following graduate courses are required and are generally taken in year one.

1. ENVIRON 710: Applied Statistical Modeling for Environmental Management (spring): required prerequisite in statistics and a passing score on the statistics diagnostic exam
2. ENVIRON 872L: Environmental Data Exploration (fall)

Choose two of the following. **Note: Not all classes are offered on a regular basis/each semester – see the current course schedule.**

- ENVIRON 558L: Remote Sensing for Environmental Analysis (fall)
- ENVIRON 559: Fundamentals of Geospatial Analysis (fall and spring)
- ENVIRON 658/A: Applied Qualitative Research Methods
- ENVIRON 665: Bayesian Inference in Environment Models
- ENVIRON 716L: Modeling for Energy Systems (fall)
- ENVIRON 790: Time Series Analysis for Energy Data (spring)
- ENVIRON 859/A: Geospatial Data Analytics - course is linked to the Marine Lab (fall)
- Other courses may be considered with advisor/program chair approval.

Environmental Economics and Policy (EEP)

The Environmental Economics and Policy management concentration has required prerequisites in calculus, statistics, and microeconomics. All incoming students should complete their prerequisite courses prior to the start of the program. Students who matriculate with one required prerequisite deficiency should plan to complete the prerequisite course in their first year of study, preferably in the fall semester.

Required Core Courses:

1. ENVIRON 520 and ENVIRON 521: Resource and Environmental Economics I-II (fall) – the two-part economics sequence requires a passing score on the calculus diagnostic exam, and students must complete required prerequisites in calculus and microeconomics. Online [options](#) are listed at the Onboarding Resources website.
 - *Students may substitute ENVIRON 635 Energy Economics and Policy or ENVIRON 680 Economics of Forest Resources for ENVIRON 521.*
2. ENVIRON 710 Applied Statistical Modeling (fall) – this course requires successful completion of the statistics prerequisite and a passing score on the statistics diagnostic exam
3. ENVIRON 577 Environmental Politics (spring)
 - *Students may substitute one of the following courses typically taught at the Marine Lab for ENVIRON 577: ENVIRON 705A Social Impact Analysis, ENVIRON 860SA Political Ecology or ENVIRON 877A Theory and Methods for Policy Analysis of the Commons*
4. ENVIRON 835 Environmental Law (spring)

ENVIRONMENT CONCENTRATIONS

Coastal and Marine Systems (CaMS)

The Coastal and Marine Systems (CaMS) environment concentration has required prerequisite courses in calculus and statistics. However, please also pay special attention to the requirements for your management concentration. It is critical that students matriculating in the Coastal and Marine Systems (CaMS) concentration **complete their prerequisite coursework** for their Environment (CaMS) **and** Management concentrations **prior to enrolling in the fall**. As outlined in the explanations for the management concentrations, this may also include a **required prerequisite course in microeconomics**.

Most Coastal and Marine Systems (CaMS) students will spend their second year at the Duke University Marine Laboratory, located in Beaufort, NC. CaMS students must therefore be prepared to take courses in the recommended sequence in the Environment concentration (CaMS) **and** their Management concentration in year one. This is especially true for **required courses in Management concentrations that are not taught at the Marine Lab**.

In addition to the gateway Coastal Marine Systems course, ENVIRON 707, CaMS students should take at least **1-2 management courses** in their **first fall semester** and should plan to enroll in at least **1-2 management courses** in their **first spring semester** as well. Please look closely at the requirements for your management and environment concentration, which are noted in this document.

For example, students who plan to pair CaMS with **Environmental Economics and Policy (EEP)** are required to take a two-part, semester long environmental economics course sequence, which is taught only in the fall semester on main campus in Durham and is not available at the Marine Lab. The EEP concentration has a **required prerequisite in microeconomics**. Any CaMS/EEP student that does not have the prerequisite and are therefore not prepared to take ENVIRON 520 and ENVIRON 521 in their first fall semester will then be required to take this course sequence in their second fall semester and this would affect the student's ability to study at the **Marine Lab** in the fall of their second year. CaMS are not required to spend two semesters at the Marine Lab during their second year, but most students in the CaMS concentration will take advantage of this opportunity.

Similarly, students who plan to pair CaMS with **Environmental Analysis and Modeling (EAM)** need to take both **ENVIRON 710** and **ENVIRON 872L** while in Durham in year one. The fall version of ENVIRON 710 will focus on statistics in the social sciences, while the spring version of this course will focus on statistics using a natural sciences lens. ENVIRON 872L is typically offered in fall and spring semesters in Durham.

Required Core Courses:

- **ENVIRON 707:** Coastal and Marine Ecosystem (fall): required gateway course
- **ENVIRON 786A:** Marine Policy (fall): Incoming students will take this course in year two at the Duke Marine Lab.

In addition to the **Management courses** noted above, the following courses are taught in **Durham only** and should be **prioritized in year one**, depending on your management concentration.

Business and Environment:

1. ENVIRON 782: Marketing for Environmental Professionals (spring)
2. ENVIRON 796: Financial Foundations for Environmental Managers (fall)
3. ENVIRON 811: Business and Environment (fall)
4. ENVIRON 831: Business Strategy for Sustainability (spring)

Community Engagement and Environmental Justice:

1. ENVIRON 755: Community-Based Environmental Management: Science and Policy (fall)
2. Environmental Justice course (choose one of the following)

- ENVIRON 506: Environmental Justice Theory and Practice (fall)
 - ENVIRON 790: Environmental Justice/Dilemma (spring)
 - ENVIRON 860SA: Political Ecology (fall semester taught at DUML)
3. Complete at least one of the following:
- ENVIRON 528SA: Community-Based Marine Conservation in the Gulf of California (typically taught in spring at DUML)
 - ENVIRON 795: Practicum in Community-Based Environmental Management (spring)
 - ENVIRON 869: Environmental Law and Policy Clinic (fall and spring)

If students have not already completed 12 credits of coursework from the list above, they may select one additional CEEJ elective to meet concentration requirements. See list of course options in CEEJ concentration section.

Environmental Economics and Policy:

1. ENVIRON 520-521: Resource and Environmental Economics I-II (fall) – the two-part economics sequence requires a passing score on the calculus diagnostic exam, and students must complete required prerequisites in calculus and microeconomics. Online [options](#) are listed at the Onboarding Resources website.
 - *Students may substitute ENVIRON 635 Energy Economics and Policy or ENVIRON 680 Economics of Forest Resources for ENVIRON 521.*
2. ENVIRON 710: Applied Statistical Modeling (fall)– this course requires successful completion of the statistics prerequisite and a passing score on the statistics diagnostic exam
3. ENVIRON 577: Environmental Politics (spring)
 - *Students may substitute one of the following courses typically taught at the Marine Lab for ENVIRON 577: ENVIRON 705A Social Impact Analysis, ENVIRON 860SA Political Ecology or ENVIRON 877A Theory and Methods for Policy Analysis of the Commons*
4. ENVIRON 835 Environmental Law (spring)

Environmental Analytics and Modeling:

The following graduate courses are required and are generally taken in year one.

1. ENVIRON 710: Applied Statistical Modeling for Environmental Management (spring): required prerequisite in statistics and a passing score on the statistics diagnostic exam
2. ENVIRON 872L (fall): Environmental Data Exploration

Choose two of the following – not all courses will be offered each semester, see current course schedule:

- ENVIRON 558L: Remote Sensing for Environmental Analysis (fall)
- ENVIRON 559: Fundamentals of Geospatial Analysis (fall and spring)
- ENVIRON 658/A: Applied Qualitative Research Methods
- ENVIRON 665: Bayesian Inference in Environment Models
- ENVIRON 716L: Modeling for Energy Systems (fall)
- ENVIRON 790: Time Series Analysis for Energy Data (spring)
- ENVIRON 859/A: Geospatial Data Analytics - course is linked to the Marine Lab (fall)
- Other courses may be considered with advisor/program chair approval.

CaMS students occasionally pair this concentration with certificate program in [Geospatial Analysis](#) to provide additional skills in these areas. Students interested in this certificate should be prepared to begin the certificate course sequence in year one.

Ecotoxicology and Environmental Health (EEH)

The Ecotoxicology and Environmental Health (EEH) environment concentration has required prerequisite courses in calculus, statistics, and chemistry – as well as recommended prerequisites in ecology and organic chemistry. Although principles of ecology and organic chemistry are not required prerequisites, these prerequisites are strongly recommended and are frequently used in EEH coursework. All incoming students should complete their prerequisite courses prior to the start of the program. Students who matriculate with one required prerequisite deficiency should plan to complete

the prerequisite course in their first year of study, preferably in the fall semester.

The following graduate courses are required and are generally taken in the first year:

1. ENVIRON 501: Environmental Toxicology (fall): required prerequisites in biology and organic chemistry
2. ENVIRON 537: Environmental Health (spring)
3. ENVIRON 539: Human Health and Ecological Risk Assessment (spring)
4. ENVIRON 540: Chemical Fate of Organic Compounds (fall) required prerequisites in chemistry and organic chemistry or ENVIRON 542L: Environmental Aquatic Chemistry (fall)

Students must choose **two courses** from their area of Specialization (6 credits minimum), in addition to the four required core courses (listed above). These specialization courses reduce the number of free electives available to EEH students. **Note: Not all classes are offered on a regular basis/each semester – see the current course schedule.**

- **Environmental Toxicology Specialization** – Recommended courses include graduate level toxicology, physiology, biochemistry, and molecular biology field. Suggested additional courses are listed below; other alternative courses may be substituted with approval by the EEH Chair.
 - ENVIRON 516: Global Change: Molecules to Organisms
 - ENVIRON 610: Ecotoxicology
 - ENVIRON 753LA: Sensory Physiology and Behavior of Marine Animals (offered at the Duke Marine Laboratory in Beaufort)
 - ENVIRON 819: Mechanisms in Environmental Toxicology
 - PHARM 533: Essentials of Pharmacology and Toxicology
 - TOXC 707: Advanced Toxicology (UNC)
- **Environmental Chemistry Specialization** – ENVIRON 540 and ENVIRON 542L are required courses for students specializing in environmental chemistry. Additional options below. Other alternative courses may be substituted with approval by the EEH Chair.
 - ENVIRON 566: Environmental Analytical Chemistry
 - ENVIRON 573A: Coastal and Marine Pollution (Beaufort)
 - ENVIRON 667: Chemical Transformation of Environmental Contaminants
 - ENVIRON 790: Environmental Cheminformatics
 - ECS 525: Ocean and Freshwater Pollution
 - ECS 571: Isotopes in Earth and Environmental Sciences
 - CEE 560: Environmental Transport Phenomena
 - CEE 666: Aquatic Geochemistry
- **Environmental Health Specialization** – Two additional courses (not including the one required core environmental health class) in a graduate level field are required. Additional options below. Other alternative courses may be substituted with approval by the EEH Chair.
 - ENVIRON 538: Global Environmental Health: Economics and Policy
 - ENVIRON 581: Global Environmental Health: Principles and Case Studies
 - ENVIRON 605: Air Quality Management
 - ENVIRON 637S: Population Environmental Dynamics & Health
 - GLHLTH 571 Intro to Global Maternal and Child Health
 - GLHLTH 705: Biostatistics and Epidemiology I
 - GLHLTH 707: Biostatistics and Epidemiology II
 - GLHLTH 795T: Bass Connections in Global Health: Interdisciplinary Team Projects
 - CEE 690: Advanced Topics in CEE Air Pollution

Energy and Environment (EE)

The Energy and Environment (EE) environment concentration has required prerequisites in calculus and statistics. All incoming students should complete their prerequisite courses prior to the start of the program. Students who matriculate with one required prerequisite deficiency should plan to complete the prerequisite course in their first year of study, preferably in the fall semester.

1. ENVIRON 520: Resource and Environmental Economics I **and** ENVIRON 635: Energy Economics and Policy (taken in year two, fall) – the two-part economics sequence requires a passing score on the calculus diagnostic exam, and students must complete the required prerequisite in calculus. Also, prior to enrolling, students are *encouraged* to complete the recommended prerequisite in microeconomics. Online [options](#) are listed at the Onboarding Resources website.
2. ENVIRON 631: Energy Technology and its Impact on the Environment (spring)
3. ENVIRON 711: Energy and Environment (fall)
4. ENVIRON 716L: Modeling for Energy Systems (fall)

Terrestrial and Freshwater Environments (TFE)

The Terrestrial and Freshwater Environments environment concentration has required prerequisite courses in calculus and statistics – as well as a highly recommended prerequisite in ecology. Students are strongly urged to complete all required and recommended prerequisites prior to matriculating. Students who matriculate with one required prerequisite deficiency should plan to complete the prerequisite course in their first year of study, preferably in the fall semester. Students failing to complete prerequisites risk falling behind in popular course sequences.

Requirements for TFE are as follows:

1. Choose two foundational natural science courses from the following:
 - a. The Climate System (ECS 511), Climate and Society (ECS 550), Landscape Ecology (ENVIRON 714), Hydrology in Environmental Management (ENVIRON 732), Watershed Hydrology (ENVIRON 734), Forest Ecosystems (ENVIRON 503), Tropical Ecology (ENVIRON 517), Freshwater Ecosystems (ENVIRON 744), Biogeochemistry (ENVIRON 564), Soil Resources (ENVIRON 721), Urban Ecology (ENVIRON 646)
2. Choose one specializing natural science course in your topical area:
 - a. Water Quality Health (ENVIRON 524), Environmental Toxicology (ENVIRON 501), Ocean and Freshwater Pollution (ECS 525), Functional Ecology of Plants (ENVIRON 505), Conserving the Variety of Life (ENVIRON 703), others as appropriate and approved by advisor.
3. Choose one social science course relevant to your focal area:
 - a. Environmental Law (ENVIRON 835), Environmental Politics (ENVIRON 577), Water Resources Law (LAW 320, 2 credits), Resource and Environmental Economics I and II (ENVIRON 520, 521, 1.5 credits each) or Resources and Environmental Economics I and Economics of Forest Resources (ENVIRON 520, 680, 1.5 credits each), Land Use Principles (ENVIRON 550)

The following courses will likely be of interest to students in this concentration, typically offered in the **fall** semester unless noted otherwise. ***Note: Not all classes are offered on a regular basis/each semester – see the current course schedule.***

- ECS 511: The Climate System: recommended prerequisite course in chemistry.
- ECS 524: Water Quality and Health (spring): prerequisite course in chemistry is strongly recommended.
- ECS 550: Climate and Society: recommended elective for TFE concentration.
- ENVIRON 501: Environmental Toxicology: prerequisite courses in organic chemistry and biology.

- ENVIRON 520 and ENVIRON 521: Resource and Environmental Economics I–II – the two-part economics sequence requires a passing score on the calculus diagnostic exam, and students must complete the required prerequisite in calculus. Also, prior to enrolling, students are *encouraged* to complete the recommended prerequisite in microeconomics. Online [options](#) are listed at the Onboarding Resources website.
 - *In part two, students have the option to take ENVIRON 521 (Resource and Environmental Economics II), 635 (Energy Economics and Policy) or 680 (Economics of Forest Resources).*
- ENVIRON 714 Landscape Ecology: prerequisite courses in ecology and statistics (this course is likely to be offered again in Fall 2024).
- ENVIRON 732: Hydrology in Environmental Management: prerequisite courses in calculus and statistics (this course will be offered again in Fall 2024).
- ENVIRON 734: Watershed Hydrology: prerequisite courses in calculus and statistics.
- ENVIRON 744: Freshwater Ecosystems (spring): prerequisite courses in principles of ecology and chemistry are recommended.

It is particularly important that students in this concentration have strong facility with analytic skills as these will underlie many courses, whether natural science or social science courses.

Other Advice/Recommendations for TFE students:

- Most, if not all, courses in engineering for water will require prerequisite courses in calculus and physics.
- For students who wish to pursue employment opportunities in hydrology for the federal government, these positions generally *require* college level courses in statistics, calculus, chemistry, and physics.

Master of Forestry (MF)

We expect students pursuing the [Master of Forestry \(MF\)](#) degree to have completed all of their prerequisites prior to matriculating. This includes required prerequisite courses in calculus, statistics, microeconomics, and principles of ecology. Students who are missing only one prerequisite might be allowed to matriculate but must request permission from the Nicholas School Registrar and the MF Program Chair(s). Such students should complete the missing prerequisite in their first year of study, preferably in the fall semester.

Given the recommended course sequencing for the Master of Forestry degree, it is especially important that students matriculate with prerequisite courses in statistics and principles of ecology already completed. We expect students to enroll in graduate courses that require these two prerequisites in their first-year study e.g., ENVIRON 710 (Applied Statistical Modeling for Environmental Management) – spring semester and ENVIRON 503 (Forest Ecosystems) – spring, ENVIRON 701 (Forest Measurements) – fall and ENVIRON 731 (Dendrology) – fall. Keep in mind, passing scores on the calculus and statistics diagnostic exams are also required in addition to successful completion of prerequisite coursework.