ENVIRONMENTAL MANAGEMENT (PH.D.)

The Montclair State Ph.D. program in Environmental Management (http://csam.montclair.edu/environ) is intended for students who have recently graduated from academic institutions with an appropriate baccalaureate or master's degree as well as for select early to mid-career professionals who would like to deepen their research credentials and their understanding of environmental management, thereby improving their qualifications for professional advancement. The program will emphasize investigations of the mechanisms and interconnections found within and among components of environmental systems (atmosphere, hydrosphere, geosphere, biosphere) and with associated human systems (political, legal, social, economic). The program offers extensive field and laboratory work allowing students exposure to cutting edge environmental research, environmental management issues, and access to state-of-the-art analytical instrumentation and computer-assisted technology. Graduates of the program will be fully prepared to enter post-doctoral research in the discipline, academic institutions, government agencies, profit or non-for-profit organizations, private sectors, etc. that deal with the environment, sustainability, and restoration issues.

The preferred deadline for receipt of all application materials for those applying for assistantships is February 15 for the Fall semester; the absolute deadline is March 15. The deadline for applications for admission without assistantships is April 30 for Fall and October 15 for Spring semester. University assistantships are typically not available in Spring.

The specific objectives of the Ph.D. program include:

- Primary emphasis on research, grounded in unique transdisciplinary approaches to address environmental issues that impact sustainability and future management.
- Preparation of scientists who are fully primed to continue with creative, cutting edge scientific discoveries that will lead to important answers and approaches within relevant issues geared towards sustainable management of the environment.
- Preparation of environmental scholars who will recognize and analyze relationships among scientific, technological, societal and economic issues, and will use research in a data-driven decision and policy making process, firmly rooted in current scientific knowledge and methodology.
- Development of research professionals who will emerge as leaders in environmental management within academia, industry and government institutions.

Consistent with other environmental Ph.D. programs around the country, the dissertation of an Environmental Management doctoral student entails extensive original research generating new ideas and new data. The dissertation consists of high quality collection and analysis of extensive original data and field work that are prepared for publication in appropriate national/international peer reviewed journals. In addition, all doctoral students are expected to present ongoing results at professional conferences and are guided to prepare and submit competitive research proposals to national, state, regional or private agencies and foundations for potential funding support of their work (e.g., NSF doctoral support programs, EPA Fellowships, Heinz Scholars for Environmental Research of dissertations, etc.). The Ph.D. program requires submission of at least one journal article for review and publication prior to a students' dissertation defense. The precedence is well set by the 4 graduates of the program who share 12 peer-reviewed journal articles and many presentations between them. The existing students have more than 25 publications, including 6 journal articles to date. The doctoral students have received awards for their outstanding presentations at scientific conferences.

The PhD program takes advantage of the University's location, within the heavily impacted New York-New Jersey metropolitan region, effectively making the region a laboratory to study a broad spectrum of environmental problems. Focus is particularly on the collection of data, analysis, understanding, and consideration of solutions to environmental issues in urban areas, both locally and parallel issues around the globe. With increased and appropriate scrutiny from government and community groups, industry must increase its vigilance on environmental controls and enhance efforts to minimize environmental disruption. Thus, the need for sound, scientifically-rooted environmental scholars and managers continues to grow. While environmental "problems" may focus on a particular issue or region (e.g. New Jersey brownfields, contaminants in Passaic River sediments, etc.), the Ph.D. program prepares students with a transdisciplinary perspective and approach that is critical to proper understanding of geographically different yet coincident environmental issues. For example, the cause and impact of a point source pollutant in New Jersey and in Shanghai may be similar, but the approach to comprehensive recognition, understanding, and possible rectification of the problem could be widely different. Students are encouraged to compare regional environmental problems with other heavily urbanized sites in developed and developing world countries.

Research

Research in the PhD program can be broadly classified into the following clusters:

Cluster 1 - Environmental Quality and Remediation
- **Key Researchers:** Drs. Sarkar, Deng, Feng, Wu.
- **Scope of Research:** Characterization/quantification of various physico-chemical processes that determine the behavior of inorganic/organic contaminants in soils and sediments. Evaluation of data (field/greenhouse/experimental) to investigate plant/human bioavailability, aqueous and solid phase speciation, precipitation and adsorption mechanisms of chemicals (contaminants and nutrients) in soils resulting from domestic/industrial wastes. Evaluation of chemical, microbial and phytoremediation techniques to clean up environmental contaminants, e.g., heavy metals.

Cluster 2 - Environmental and Urban Ecology
- **Key Researchers:** Drs. Prezant, Bologna, Wu, Krumins.
- **Scope of Research:** Understanding interactions among hydrological, geological, biogeochemical and biological systems in urbanized, freshwater, estuarine, and coastal environments. Analyzing the relationships between habitat and the production of certain species to identify critical habitats that link "bottom up" recruitment of juveniles to the adult stages.

Cluster 3 - Earth Systems and Climate Change
- **Key Researchers:** Drs. Passchier, Chopping, Trueba.
- **Scope of Research:** Monitoring of Earth's surface processes from the ground, air, ocean, and space. Earth's climate systems include regularly-repeating cycles, positive and negative feedbacks, and abrupt events—processes that affect Earth's surface temperature, the chemistry of the atmosphere and ocean, soil moisture, and the size.
and stability and ice sheets; and in turn affect societal communities through sea level rise and fall, the frequency and intensity of storms, the type and extent of vegetation, changes in the geographic range of flora, fauna, and pathogens.

**Cluster 4 - Environmental Modeling and Visualization**
- **Key Researchers:** Drs. Chopping, Yu, Feng, Ophori, Sarkar, Billings, Forgoston, Trueba.
- **Scope of Research:** Application of remote sensing techniques to quantitatively model ecosystem structure, function and health; hydrodynamic modeling of water flow; geochemical fate modeling; sediment and contaminant transport in aquatic systems; modeling of urban systems using spatial analysis (e.g., GIS-based design of urban streets to lessen stormwater runoff and flooding). Design of mobile sensing arrays/platforms in "noisy" environments. Analysis of effects of sustainable environmental remediation technologies, e.g., natural drainage applications of bioremediation and management practices. Epidemiological modeling.

**Cluster 5 - Environmental Policy, Social, and Management Impacts**
- **Key Researchers:** Drs. Taylor, Lal, Mukherjee, Wang.
- **Scope of Research:** Constructing indicators and establishing models for monitoring urban systems. Valuation of ecosystem services and assessing public policy options pertaining to climate change mitigation and adaptation, bioenergy, and green infrastructure. Finding opportunities for enhancing sustainability, equity, and vulnerability reduction in communities and institutions. Estimating ecological and human health risk for environmental decision-making. Green and sustainable marketing practices.

### Program Requirements

#### Core Courses
- **BIOL 570** Ecology 3
- **EAES 561** Environmental Law and Policy 3
- **EAES 700** Earth Systems Science 3
- **EAES 760** Organizational Environmental Management 3

#### Required Research Courses
- **EAES 895** Research Project in Environmental Management I 3
- **EAES 896** Research Project in Environmental Management II 3

#### Perspective Courses
**Methods Perspective**
- **STAT 541** Applied Statistics 3
- or **STAT 595** Topics in Statistics

**Natural Science Perspective**
- **EAES 505** Environmental Geoscience 3
- or **EAES 533** Water Resource Management

**Social Science Perspective**
- **ANTH 522** Environment and Community 3
- or **EAES 792** Special Topics

**Business Perspective**
- **MGMT 565** Project Management 1.5
- **MKTG 563** Sustainability and Corporate Responsibility 1.5

#### Research Requirements
**Colloquium**
- **EAES 790** Colloquium in Environmental Management 1

#### Required Dissertation Courses
- **EAES 900** Dissertation Advisement 3-12
- **EAES 901** Dissertation Extension (each semester as required) 1

#### Electives
- Select 6 credits from the list (see below) 6

#### Qualifying Portfolio/Exam/Assessment
- Successfully complete the qualifying portfolio, examination or assessment requirement.

#### Admission to Candidacy
- Following completion of pre-dissertation research courses and qualifying exam, you may be admitted to candidacy.

#### Dissertation Requirement
- Complete a dissertation in accordance with Graduate School and doctoral program requirements.

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<th>Total Credits</th>
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#### Electives
- **ANTH 529** Building Sustainable Communities 3-4
- **BIOL 520** Plant Physiology 3
- **BIOL 543** Advances in Immunology 3
- **BIOL 547** Molecular Biology I 3
- **BIOL 550** Topics in Microbiology 3
- **BIOL 554** Microbial Physiology 3
- **BIOL 571** Physiological Plant Ecology 4
- **BIOL 572** Wetland Ecology 4
- **BIOL 573** Shoreline Ecology 4
- **CHEM 510** Hazardous Materials Management 3
- **CHEM 525** Bioinorganic Chemistry 3
- **CHEM 534** Separation and Analysis 3
- **CNFS 505** Society and the Natural Environment 2
- **CNFS 510** Environmental Impact of Recreation on Natural Areas 2
- **CNFS 525** Field Laboratory Experience in Society and the Natural Environment 1
- **EAES 509** Current Issues in Sustainability Science 3
- **EAES 525** X-ray Microanalysis 3
- **EAES 526** Geochemistry 3
- **EAES 527** Organic Geochemistry 3
- **EAES 528** Environmental Forensics 3
- **EAES 529** Instrumental Environmental Analysis 3
- **EAES 531** Hydroclimatology 3
- **EAES 532** Applied Groundwater Modeling 4
- **EAES 535** Geophysics 3
- **EAES 550** Advanced Marine Geology 3
- **EAES 562** Waste Management 3
- **EAES 563** Natural Resource Management 3
- **EAES 565** Environmental Change and Communication 3
- **EAES 566** Environmental Problem Solving 3
- **EAES 569** Air Resource Management 3
- **EAES 610** Spatial Analysis 3
- **EAES 611** Advanced Environmental Remote Sensing and Image Processing 3
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<td>EAES 701</td>
<td>Modeling in Environmental Science</td>
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<td>EAES 710</td>
<td>Advanced Geographic Information Systems</td>
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<td>EAES 791</td>
<td>Research Methods</td>
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<td>EAES 792</td>
<td>Special Topics</td>
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<td>HLTH 502</td>
<td>Determinants of Environmental Health</td>
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<td>HLTH 565</td>
<td>Foundations of Epidemiology</td>
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<td>PHMS 565</td>
<td>Tidal Marsh Ecology</td>
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<td>SOCI 581</td>
<td>Sociological Perspectives on Health and Medicine</td>
<td>3</td>
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<td>STAT 547</td>
<td>Design and Analysis of Experiments</td>
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<td>STAT 548</td>
<td>Applied Regression Analysis</td>
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<td>Statistical Methods for Research Workers II</td>
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<tr>
<td>BIOL 595</td>
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<td>or CNFS 595</td>
<td>Conservation Biology: The Preservation of Biological Diversity</td>
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