



Sept 2009

Global Environmental Change (Master of Environmental Management)

The Global Environmental Change program trains students to analyze environmental changes that occur on a variety of temporal and spatial scales and to anticipate and respond to management and policy issues that arise from these changes. Global environmental change includes global climate change, but it also includes widespread changes in the world's terrestrial environments, oceans, and coastlines. These changes, in turn, are affecting the well-being of human populations and of biological components of the global system. The Global Environmental Change program provides an integrated package of fundamental environmental science, analytical skills, and management and policy training. Graduates of the program will be well equipped to serve as environmental analysts and managers bridging the gap between advances in the science of global change and the policy initiatives needed to manage the consequences of global change. The program is designed to provide the necessary background for a student to develop a career in public, private, or nonprofit sectors, or to pursue further studies in environmental science and policy. The program has particular strengths in global climate change, biodiversity, coastal environmental change, and earth surface processes, with faculty participating in a wide range of activities in these areas. Students in the Global Environmental Change program would have close interactions with a number of Duke centers, including the Center for Global Change, the Center for Environmental Solutions, and the Duke University Marine Laboratory.

The Global Environmental Change program seeks to educate students in:

1. Analysis of environmental changes that occur on a variety of temporal and spatial scales and understanding of the scientific principles underlying these changes;
2. Quantitative and analytical skills of geospatial analysis and remote sensing, applied mathematics and statistics, and quantitative modeling that are required to understand complex environmental problems and to formulate their solutions;
3. Basic principles of economics, management, law, and policy that are necessary to properly inform decision making in a wide array of environmental issues;
4. Oral and written skills needed to communicate decisions or to communicate with decision makers, including the ability to conduct research, write cogent research reports, and to deliver effective oral presentations.

During the first year of study, students enrolled in the program of Global Environmental Change will work with a faculty member on course selection and in determining an area of study for the Master's Project. By the end of the first year, the student will choose an advisor who will work with the student on developing a project, as well as advising on courses to be taken during the second year. In the second year, the student will complete the course requirements and devote time to the completion of the Master's Project. A paper and presentation will be made at the end of the second semester of the second year.

This program relies largely on faculty and courses taught at the Durham campus, but it is possible for a student to take appropriate classes for one semester (fall) at the Duke University Marine Laboratory. This approach would be desirable if the student is interested in developing a project dealing with coastal environmental change.

Prerequisites:

Prerequisites for admission to the school are (1) some previous training in the natural sciences or the social sciences related to the student's area of interest, (2) at least one semester of college calculus; (3) a statistics course that includes descriptive statistics, probability distributions, hypothesis testing, confidence intervals, correlation, simple linear regression, and simple ANOVAs. For the Global Environmental Change program, introductory courses in earth sciences/geology and biology are also recommended. Deficiencies may be made up in the first semester of classes, but do not count towards degree requirements. Note that specific courses may require additional prerequisites.

Course Requirements:

The program requires 48 credits of which 15 are selected from basic science of global change courses, 5-7 for a Master's Project, 9 from analysis and tools courses, 12 from policy and management courses, and the remaining credits from elective courses. Courses may be substituted in these categories, in consultation with the advisor and with permission from the program director. The student is encouraged to develop an area of specialization within the program (e.g., coastal processes, climate change, surface processes) and select core courses and analytical courses focused in that area.

1. Basic Science of Global Change (choose 6)

- EOS 155 Global Warming (TBA) F
- EOS 211 The Climate System (Li) (**required**) F
- EOS 215 Waves, Beaches, Coastline Dynamics (Murray) F
- EOS 251S Global Environmental Change (Baker) (**required**) S
- EOS 272 Biogeochemistry (Bernhardt) F
- ENVIRON 211 Energy and the Environment (Pratson) F
- ENVIRON 214 Landscape Ecology (Urban) F
- ENVIRON 221 Soil Resources (Richter) F
- ENVIRON 234L Watershed Hydrology (Katul) F
- ENVIRON 242 Environmental Aquatic Chemistry (Hsu-Kim) F
- ENVIRON 257L Biodiversity Science and Application (Clark and Wright) F

ENVIRON 279 Introduction to Atmospheric Chemistry (Kasibhatla) F
BIOLOGY 217 Ecology and Global Change (Jackson) S
CE 265.03 Advanced Topics: Physical Hydrology, Hydrometeorology (Barros) F

2. Analysis and Tools (choose 3)

EOS 240 Introduction to Computer Modeling in the Earth Sciences (Haff) F
ENV 210.001 Applied Data Analysis for Environmental Science (Qian) F
ENV 255 Applied Regression Analysis S
ENV 259.001 Fundamentals of Geospatial Analysis (Halpin) F
ENV 264 Applied Differential Equations in Environmental Science (Katul) F
ENV 357 Satellite Remote Sensing for Environmental Analysis (Swenson) F

3. Policy and Management (choose 4)

ENV 235 Air Quality Management (Vandenberg) F
ENV 236 Water Quality Management (Gronewold) F
ENV 270 Resource and Environmental Economics (Smith) F
ENV 274 Environmental Politics (staff)
ENV 385 Environmental Decision Analysis (Maguire) S
LAW 235 Environmental Law (Salzman)

4. Electives (2)

Two other courses approved by advisor.

5. Master's Project (2)(5 to 7 credits)

ENV 399.xx Master's Project (4 to 6 credits)
ENV 398.xx MP Seminar (1 credit to be awarded at end of 4 semesters)

S=Spring; F=Fall

VI. Participating Faculty

Faculty members who are participating in this program and will serve as advisors are listed below with contact information. Additional information can be found at individual web sites at <http://www.nicholas.duke.edu>

Paul A. Baker (Program Director)	684-6450	pbaker@duke.edu
Ana Barros	660-5539	barros@duke.edu
James S. Clark	613-8036	jimclark@duke.edu
Bruce H. Corliss	684-2951	bruce.corliss@duke.edu
Peter K. Haff	684-5902	haff@duke.edu
Robert B. Jackson	660-7408	jackson@duke.edu
Prasad S. Kasibhatla	613-8075	psk9@duke.edu
Wenhong Li	684-5015	wenhong.li@duke.edu
M. Susan Lozier	681-8199	s.lozier@duke.edu
A. Brad Murray	681-5069	abmurray@duke.edu

Lincoln F. Pratson
Daniel D. Richter, Jr.
Avner Vengosh

681-8077
613-8031
681-8050

lincoln.pratson@duke.edu
drichter@duke.edu
vengosh@duke.edu

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