October 2017

Dear NS professional students and faculty:
Here is some information (mostly Durham-based, with some Marine Lab news) that may be helpful to you in planning your academic program for the Spring 2018 semester. We have included changes to the schedule of Nicholas School courses and alerted you to changes in faculty whereabouts. Please refer to the course synopsis in DukeHub or in the catalogue to examine a course’s content in more depth. We continue to encourage faculty to paste syllabi and other course information there.

- Professor Deb Gallagher, Director of Professional Studies
  & Cynthia Peters, Assistant Dean

Faculty/Staff Information

Faculty on sabbatical, Spring 2018:
Curt Richardson. ENVIRON 809 Wetland Restoration Ecology will not be offered.
Bill Pan. ENVIRON 637S, Population/Environmental Dynamics & Health will not be offered
Marco Marani continues on leave. ENVIRON 322/EOS 322 will not be offered spring 2018
Brian McGlynn. EOS 723 and EOS 323 will not be offered
Joel Meyer on leave spring 2018. ENVIRON 102 will be taught by Professor Jennifer Wernegreen (TuTh 8:30-9:45, 111 BioSci); ENVIRON 848 will be offered, taught by Professor Ed Levin.

New faculty:
Professor Luana Lima is a new professor in the Energy and Environment area. She will be teaching a new course in the spring. Look for an email with regard to the details of the course in a couple of weeks.

Changes to Existing Courses:
ENVIRON 201: Taught by Professor Charlotte Clark (MW 8:30-9:45)
ENVIRON 205: Taught by Professor Meagan Dunphy-Daly (MW 1:25-2:40)
ENVIRON 212: Taught by TBD (TuTh 3:05-4:20)
ENVIRON 537, Environmental Health: Taught by Professor Kate Hoffman rather than Professor DiGiulio (TuTh 10:05-11:20)
ENVIRON 556, Environmental Conflict Resolution: Taught by Professor Lou Addor (Fr 10:05-12:35)
ENVIRON 806 Duke Forest Practicum, taught by Professor Sari Palmroth (Field/Travel)
ENVIRON 982, DEL: Sustainable Development in Chile: Taught by Professor Dalia Patino-Echeverri (M 8:00-9:30)

New Courses:
Durham

ENVIRON/EOS 513 Groundwater and the Environment. O'Driscoll, Michael. TuTh 3:05-4:20. 3 credits. NEW COURSE.
An introduction to the principles of groundwater flow, development, and protection, with an emphasis on aquifer and groundwater evaluation and management. Topics include: baseflow analyses; stream-groundwater interactions; aquifer and vadose zone characterization; groundwater hydraulics and recharge; field hydrogeological data; groundwater modeling; water quality; and groundwater management. Open only to students who have at least one semester
of college natural science (physics, earth science, chemistry, or biology). To develop a basic understanding of hydrogeology students will:

- Describe how water cycles through surface and subsurface systems;
- Define the hydraulic properties of aquifers and confining beds;
- Cultivate problem solving skills in hydrogeology that can assist in groundwater decision making;
- Evaluate approaches for addressing uncertainty in data, incomplete data, and the variability of natural materials common in hydrogeologic studies;
- Analyze stream discharge, groundwater hydraulic head, and hydrograph data;
- Map and interpret the basic physics of groundwater flow;
- Evaluate why and how groundwater quality changes from recharge to discharge areas;
- Identify sources of contamination and potential remediation strategies for surface and subsurface waters.

**ENVIRO 529. Our Changing Atmosphere. Kasibhatla, Prasad. MW 3:05-4:20. 3 credits.** NEW COURSE NUMBER.

Course number changed to make the course more accessible to both graduate and undergraduate students. A broad overview of the science of oxidant chemistry in the atmosphere. Basic physical and chemical concepts relevant to the understanding of atmospheric chemistry; several contemporary topics discussed from a process-level perspective. Topics include atmospheric structure and chemical composition; atomic structure and chemical bonds; chemical thermodynamics and kinetics; atmospheric radiation and photochemistry, tropospheric and stratospheric ozone chemistry; aqueous-phase atmospheric chemistry; atmospheric aerosols; and air quality modeling. Prerequisites: one college-level course each in chemistry and calculus.

**ENVIRO 585 Marine Fisheries Biogeography and Ecology. Dunn, Daniel. MW 11:45-1:00. 3 credit hours. NEW TITLE and DESCRIPTION.**

Current status of the distribution and abundance of fisheries globally and current topics in fisheries ecology, explored through lecture and discussion of primary literature. Participation in leading discussions and mini literature review. Intended for master and doctoral students; undergraduate by permission of instructor. Taught in Durham and Beaufort: basic knowledge of ecology and oceanography. Instructor: Dunn. C-L: Marine Sciences, Marine Science and Conservation.

**ENVIRO 741 Water Resources Finance. Doyle, Martin. TuTh 8:30-9:45. 1.5 credit hours. NEW COURSE.**

This course is intended to provide students with applications of project finance to water assets, particularly municipal water/wastewater systems and irrigation infrastructure, financed primarily through municipal bonds. The primary concepts will be forecasting demand, revenue-generation, pricing effects, debt financing, and emerging alternative finance. The first half of this course was taught in fall 2017 (ENV 740 Water Resources Planning and Management).

**ENVIRO 790.10 Reporting and Certifications. Wedding, Chris. Th 5:00-8:00pm. 3 credits. NEW COURSE.**

This course will focus on the leading environmental reporting and certification programs that are catalyzing positive financial, environmental, and social benefits. Their focus varies and can include corporate sustainability, energy efficiency, responsible forestry management, water efficiency, social responsibility, green building, or healthy products. Examples include LEED (Leadership in Energy and Environmental Design), GRI (Global Reporting Initiative), SASB (Sustainability Accounting Standards Board), ENERGY STAR, FSC (Forestry Stewardship Council), B Corp, and dozens of others. In addition to students becoming familiar with the most impactful reporting and certification programs, we will discuss the business strategies behind each. The course will include guest speakers from the field, up-to-date readings, forum discussions, and practice-oriented assignments.

**ENVIRO 790.30 Time Series Analysis for Energy Data. Marangon, Luana. MW 10:05-11:20am. 3 credits. NEW COURSE.**
Time series and forecasting methods continue to improve due to the enhancements in computing power and capability of dealing with larger data sets. This course will focus on time series analysis, models and forecasting, with emphasis on energy and environment applications. Throughout the course we will use real data sets from the US Energy Information administration (EIA), National Oceanic and Atmospheric Administration (NOAA) and the National Renewable Energy Laboratory (NREL). This course will use R for most statistical analyses. Lectures will feature R syntax and/or demonstrations using the R Studio user interface. Note that R and R Studio work on Windows, Linux, and Mac operating systems. Energy Analytics usually involve getting data, parsing the data and transforming the data to a state where you can actually apply time series analysis. This work is better done in Python, therefore the course will also cover a short introduction on Python. Upon completion of the course, the students will be able to use R to carry out basic statistical modeling and analysis and a model to data. Our goal is to enable students to learn from data in order to gain useful predictions and insights.

**ENVIRON 891 Economic Instruments for Environmental Protection.** Murray, Brian. M 4:40-5:55pm. 1.5 credits. NEW TOPIC. Environmental problems typically arise from externalities - economic incentives that do not properly account for the societal costs of pollution, depletion of natural resources, and other environmental harms. Economists have long prescribed economic instruments, or “market-based” policies to rectify the problem. These approaches seek to assign a price, market value or some other form of monetary signal to ensure that economic transactions account for the full social cost of the good or service being provided, including its impact on the environment. This will in turn raise the cost of environmentally harmful activity and thereby create incentives to reduce those harms. Such approaches include pollution taxes, tradable emissions permits (sometimes called “cap and trade”), offset credits, and tradable performance standards. This course will explore these instruments as they have been applied to environmental problems such as climate change, acid rain, overfishing, deforestation and water scarcity. The course will use economic principles and quantitative methods to assess the design and performance of these instruments in the real-world settings that they have been applied in recent years. This will involve lectures, readings, and written assignments that explore basic design principles for these instruments, benefits and costs of their adoption, real-world hurdles to implementation, and ex post assessment of how they have worked in practice. The course will also draw upon Professor Murray's experience in working with policymakers at state, national and international levels on the implementation and refinement of economic instrument policies as well as guest lectures by practitioners from the private and public sectors involved in their use in the field. The course will also address some of the philosophical and practical objections some parties have to the use of economic instruments for environmental protection. Prerequisite: ENV 520 Resource and Environmental Economics.

**Duke Marine Lab**  
**ENVIRON 314A. Managing the Oceans to Solve Global Problems.** Roady, Steve and Virdin, John. Duke Marine Lab. 1 course. NEW COURSE. The importance of the oceans in addressing central problems facing the world, including poverty, hunger, access to energy, climate change, and biodiversity loss. The fundamental role the oceans could play depends on public policies created to manage them. Important laws and policies that make the resources and services provided by the ocean resilient and sustainable. Explore challenges of protecting corals, regulating fishing and pollution, and helping climate refugees. Fundamental principal legal and policy mechanisms that support reducing greenhouse gas emissions and protecting the oceans and coasts through adaptation and marine resilience in the face of human drivers of change.

This course will introduce students to important laws and policies that make the resources and services provided by the ocean more resilient and sustainable. Students will emerge with a basic
grasp of the principal legal and policy mechanisms that support reducing greenhouse gas emissions and protecting the oceans and coasts through adaptation and marine resilience in the face of human drivers of change. We will explore such challenges as protecting corals, regulating fishing and pollution, and helping climate refugees.


Deep-Sea Science and Environmental Management explores ecosystems in the deep sea, including fundamental aspects of geology, chemistry, and biodiversity; behavioral, physiological and biochemical adaptations of organisms (primarily invertebrate, but may include microbial and vertebrate components) to deep-sea benthic and benthopelagic environments will be introduced; students will gain an understanding of the ecosystem services of the deep sea; issues in deep-sea environmental management arising from exploitation of deep-sea resources will be discussed. Students will gain a basic understanding of deep-sea ecosystem diversity, adaptations to special features of the deep sea environment, and deep-sea ecosystem services and gain experience in crafting research questions and undertake original research using video from the deep sea and the primary literature.

Be sure to check under ENVIRON 590 for various special topics courses including

- 590.51 Petroleum Exploration, Victor Friedman and Tim Johnson
- 590.54 LIDAR Remote Sensing, Jennifer Swenson
- 590.84 Environmental Entrepreneurship Finance, Jesko von Windheim
- 590.86 Ecosystems Service Markets in Practice, Lydia Olander
- 590s.30 Narrating Nature: Documentaries, Miguel Rojas Sotelo