University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Science for Environmental Management 3 credits

MEES 698Y
Spring Semester

Course Objectives / Overview

This course will expose students to a wide range of environmental management principles, tools, and applications. This course will also prepare students to synthesize and communicate science effectively for use in environmental management.

Providing students with practical skills for incorporating science into environmental management is the goal of the course. These skills will complement the *Masters of Environmental Management* curriculum, which is a joint program between UMCES and Frostburg State University, and the *Marine Estuarine and Environmental Science* graduate program.

Course description:

This course will provide students with an opportunity to obtain literacy in a variety of environmental issues, use science and technical information to inform environmental management, and effectively communicate environmental policy across a broad spectrum of science advising. The course will explore the evolution of environmental management and explore how today's environmental managers inform effective policy using a participatory, transdisciplinary approach to socio-environmental management and justice. Environmental decision-making will be analyzed using a variety of case studies across a diversity of scales. These case studies will serve as lessons learned to apply to strategies for integrating complex coupled human and natural systems.

Expected Learning Outcomes

1. Develop an understanding of the various roles of scientists across the spectrum of engagement with environmental management.
2. Compare and contrast different science advising strategies in case studies scaled across size, population, complexity and maturity dimensions.
3. Analyze how monitoring, modeling, research and resource management approaches are utilized in environmental management.
4. Determine the most effective use of science and technical information to impact environmental management.
5. Create effective approaches for managing environmental challenges across a range of sustainability and resiliency issues.

INSTRUCTOR DETAILS:

Vanessa Vargas-Nguyen
vvargas@umces.edu
201-406-5904

William Dennison
dennison@umces.edu
410-221-2004

CLASS MEETING DETAILS:

Dates: Spring Semester
Times: Friday 1-4 pm
Originating Site:
IVN bridge number: (*******)
Phone call in number: (***)
Room phone number:(*****)

COURSE TYPE:

Check all that apply

☐ Foundation
☐ Professional Development
☐ Issue Study Group
☐ Seminar
☒ Elective

Prerequisites

Admission to either the *Master of Environmental Management* program or the *Marine Estuarine and Environmental Science* graduate program.

Teaching Assistant

TBD

CURRICULUM FULFILLMENT:

This course fulfills a requirement for the *Masters of Environmental Management* program.

Course Assessment / Grading

- Class Participation (20%)
- Synthesis blogs (20%)
- Management briefing (20%)
- Briefing document (40%)

Tentative Weekly Course Schedule

Week 1 Introduction

Environmental management overview, frameworks for socio-environmental management, ecosystem-based management, sustainability and resilience, transformation to sustainability, adaptive management and adaptive governance.

Week 2 Conservation and environmental movements

Conservation movement, emergence of the environmental movement, institutionalization of the environmental movement, globalization of the environmental movement, current and future of the environmental movement, coupled human and natural systems.

Week 3 Science advising strategies

Studying vs. solving environmental problems, roles scientists play, science advising spectrum, environmental policy and management case studies.

Week 4 Stakeholder engagement and co-production

Why stakeholder engagement, classifying problems, transdisciplinary approaches, planning and implementing transdisciplinary approaches, evaluating transdisciplinary approaches, best practices in transdisciplinary research.

Week 5 Socio-environmental problem solving

Scientific synthesis, systems approaches/systems thinking, citizen science, science and the media, science and environmental law, socio-environmental justice.

Week 6 Case studies along a population gradient

Palau marine protected areas, Chincoteague Bay water quality issues, Moreton Bay ecosystem health, Chesapeake Bay eutrophication, Asian megacity (Zhujiang River) public and ecosystem health.

Week 7 Case studies along a complexity gradient

New York Harbor water quality & oysters, Coastal Louisiana/Gulf of Mexico sea level rise, Great Barrier Reef climate change, Baltic Sea eutrophication, Mississippi River socio-environmental balance.

Week 8 Environmental assessment and reporting

Introduction to assessment and reporting, environmental report cards, identifying indicators and thresholds, calculating scores, data synthesis, data visualization, designing and communicating report card results.

Week 9 Coastal Ocean Assessment and Sustainability for Transformation (COAST Card)

Development of socio-environmental report cards, social network analysis and system dynamics models for Chesapeake Bay, Manila Bay, Tokyo Bay, Ishigaki Island/Sekisei Lagoon, Goa coast of India.

Week 10 Climate change science and management

Climate change impacts, adaptation and mitigation, climate change education, global, national & regional assessments, developing resilience strategies.

Week 11 Science communication

Why science communication is important, the science behind science communication, data visualization principles, storyboarding, design and layout principles, photos and videos, color theory, symbols and diagrams, science communication products.

Week 12 Oral presentation training

Assembling a presentation, presentation preparation, delivering a presentation, addressing questions, follow up activities

Week 13 Presentation and management briefing feedback

Draft powerpoint review, management briefing document review, peer-to-peer feedback and instructor feedback.

Week 14 Final presentations; Management briefings

Course debrief and review.

Required textbooks, reading and/or software or computer needs

Reading will be assigned as needed. Access to a laptop or desktop computer with one graphing program (e.g., R or Excel) and one mapping program (e.g., QGIS) installed.

Dennison, W. C., & Thomas, J. E. (2009). *Shifting sands: Environmental and cultural change in Maryland's coastal bays*. IAN Press.

Longstaff, B. J., Dennison, W. C., Lookingbill, T. R., Hawkey, J. M., Thomas, J. E., Wicks, E. C., Woerner, J., & Carruthers, T. J. B. (2010). *Integrating and applying science: A practical handbook for effective coastal ecosystem assessment*. IAN Press.

Schubel, J. R. (2021). *The future Chesapeake: Shaping the future*. Archway Publishing.

Course Communication

The course will use Google Drive for course files and Slack for course communication.

Resources

TBD

Campus Policies

The University of Maryland Center for Environmental Science has drafted and approved of various academic and research-related policies by which all students and faculty must abide.

Please visit http://www.umces.edu/consolidated-usm-and-umces-policies-and-procedures for a full list of campus-wide academic policies.

Course-Specific Policies and Expectations

The course includes two required field trips. Assessment of field work performance and reporting represents 50% of the course grade. Students who are not able to participate in the two field trips should not sign up for this course.