Environmental Sciences: Integrated Problem Solving

ESPM 2021 (3 Credits)

Course Syllabus – Spring 2017

Course Meeting Time and Location:

3:00 p.m. – 4:15 p.m., Tuesday/Thursday, Biological Sciences 64, St. Paul Campus

Course Instructors:

Satoshi Ishii
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Office Hours:
Satoshi Ishii: Thursdays 1:30-2:30 pm
Mae Davenport: Tuesdays 12:30-1:30 pm
TAs: By appointment

Teaching Assistants:
Emily Anderson: and02435@umn.edu
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Important: If you email one of your instructors about the class, include "ESPM 2021" at the beginning of the subject line. Please copy both instructors on your email correspondence.

Required Readings:

All assigned readings and supplemental resources will be available on the course website accessible via Moodle (https://moodle.umn.edu/). Complete the readings before the classes. Check frequently for updates.

Course Description and Focus:

Environmental issues facing the world today are increasingly complex. Global climate change, air and water quality impairments, land use change for forest and agricultural production, and species conservation require an ability to conceptualize problems broadly so that solutions are crafted in a manner that addresses a multitude of perspectives and considerations.

Environmental solutions will require the ability to structure problems that are ill defined, ambiguous and ever changing, and that incorporates input from multiple disciplines. Employers are increasingly seeking individuals with the ability to work in teams to resolve these complex problems and to contribute to the creation of new knowledge. For this reason, it is important that Environmental Sciences, Policy, and Management

(ESPM) graduates develop strategies for resolving complex problems. This course will challenge you to frame environmental problems working in interdisciplinary teams and to develop a "tolerance for ambiguity" that will carry forward in upper division courses and in your professional pursuits.

Student Performance Objectives:

Upon completion of this course, you will be able to:

- Craft reasonable solutions to complex environmental problems using the techniques and strategies demonstrated in class in addition to those you bring from previous experience,
- Reflect on varying environmental problem solving processes through collaboration,
- Identify and assess key aspects of group dynamics to work effectively in interdisciplinary teams,
- Apply problem-solving skills, and
- Communicate environmental issues effectively both orally and in writing.

Course Format:

This is a team-based course with extensive use of interdisciplinary thinking, personal and group reflection, and collaborative problem solving. The primary instructional technique used is "learning by doing" accomplished by identifying, defining, and exploring environmental problems and sustainable solutions. Case study analysis, group brainstorming and experience sharing, small group discussion, and role-playing are used. Student-generated cases will also be used to develop strategies for asking questions, framing problems, and exploring alternative solutions.

In addition to being heavily focused on interdisciplinary education, students are also expected to participate in two experiential opportunities: a field trip and an informational interview. A choice of fieldtrips will be provided where you will be exposed to an environmental problem that requires integrated problem-solving. All field trips are located off-campus and transportation will be provided.

Module	**Process Goals**	**Major assignments**
Module 1	Working in Teams	Problem statement
Module 2	Defining problems	Poster presentation
Module 3	Exploring solutions	Oral presentation
Module 4	Integration	Field trip and professional interview

Student Expectations and Policies:

1) ***Moodle site***: In addition to class meetings, the course Moodle site will be the main clearinghouse of important information, assignments (including some assignment submission), and due dates related to the class. You are responsible for checking the Moodle site per each class.
2) ***Attendance*:** The interactive style of learning used in this course makes it necessary for you to attend ALL classes. Much of the work and most of your knowledge (and grade) will derive directly from in-class exercises.

3) ***Assignments*:** Written assignments are to be submitted electronically via the Moodle course site by the posted due date/time. No late assignments are accepted unless pre-arranged or for special circumstances.
4) ***Electronics use*:** Use of electronic devices is limited to notetaking unless stated otherwise by the instructors. There will be times during most class periods when laptops may be helpful for research or for team collaboration. You are encouraged, but not required, to use your laptops during these times. http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html
5) ***Disability accommodations*:** The University of Minnesota views disability as an important aspect of diversity, and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you have, a disability in any area such as, mental health, attention, learning, chronic health, sensory, or physical, please contact the DRC office on your campus (UM Twin Cities - 612.626.1333) to arrange a confidential discussion regarding equitable access and reasonable accommodations.
    - Students with short-term disabilities, such as a broken arm, can often work with instructors to minimize classroom barriers. In situations where additional assistance is needed, students should contact the DRC as noted above.
    - If you are registered with the DRC and have a disability accommodation letter dated for this semester or this year, please contact your instructor early in the semester to review how the accommodations will be applied in the course.
    - If you are registered with the DRC and have questions or concerns about your accommodations, please contact your (access consultant/disability specialist).
6) ***Student mental health and stress management***: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via http://www.mentalhealth.umn.edu/.
7) ***Sexual harassment*** means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf
8) ***Student Conduct Code***: The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and

that does not threaten the physical or mental health or safety of members of the University community. As a student at the University you are expected adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html. Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

9) ***Scholastic dishonesty*:** You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

Other Polices and Services: For information on other course polices and university services please see:

- Equity, Diversity, Equal Opportunity, and Affirmative Action: http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html.
- Makeup Work for Legitimate Absences: http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html.
- Appropriate Student Use of Class Notes and Course Materials: http://policy.umn.edu/Policies/Education/Education/CLASSNOTESSTUDENTS.html.
- Grading and Transcripts: http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html.
- The University's Academic Freedom and Responsibility policy is taken seriously in this course.

Evaluation:

Evaluation will focus on team products including a research statement, poster presentation and oral presentation; two take-home essay exams; and attendance and participation. Other activities include bluebook reflections, field trip attendance and reporting, self- and peer-assessment, and an informational interview with a professional

engaged in environmental problem solving. Much of the work and most of your learning (and evaluation) is based directly on in-class work. Classroom experiences such as team-

Activity	Points	% of Grade
Team products	3 products x 25 pts = 75 pts	30
Exams	2 exams x 25 pts = 50 pts	20
Attendance and participation	50 pts	20
Bluebook reflections	10 reflections x 3 pts = 30 pts	12
Field trip	15 pts attendance + 5 pts report = 20 pts	8
Self and peer assessment	3 assessments x 5 pts = 15 pts	6
Informational interview	10 pts	4
Total	250 pts	100

building, collaborative problem solving, and dialogue cannot be made up if you miss a class (unless absence is excused according to University policy). Coordinate with instructors or TAs on making up assignments for excused absences.

Course grades will be assigned as follows:

A Demonstrated achievement is outstanding relative to the level necessary to meet the course requirements (100 – 90 percent).

B Demonstrated achievement is significantly above the level necessary to meet the course requirements (89 – 80 percent).

C Demonstrated achievement meets the course requirements (79 – 70 percent).

D Demonstrated achievement is worthy of credit even though it fails to fully meet the course requirements (69 – 60 percent).

F Represents failure (no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit, or (2) not completed and no agreement between the instructor and student that the student would be awarded an "I" (< 60 percent).

I Incomplete assigned at the instructors' discretion when, due to extraordinary circumstances, a student is prevented from completing the work on time. An incomplete requires a written agreement between the instructor and student specifying dates and conditions for completion of the make-up work.

Course Outline and Schedule:

Module #1: Working in Teams	
This module introduces different ways of knowing and thinking with an emphasis on getting to know your teammates and their skills/strengths, identifying problems using systems thinking, and communicating a problem statement. The unique contributions from the disciplinary fields involved in environmental problem solving are discussed. Exercises will focus on identification of personal strengths, skill development working in teams, and debriefing on the roles and responsibilities of team members in an interdisciplinary setting. **Case Study Topic: Stormwater Management**	
Jan 17	**Introduction to Integrated Problem Solving:** Class overview
Jan 19	**Team building:** Desert Challenge, ESPM 2021 Bingo
Jan 24	**Guest speaker:** Seitu Jones, Capitol Region Watershed District Board of Managers; **The process of problem identification:** Reductive vs. systems thinking
Jan 26	**The problem of stormwater management:** Case study presentation
Jan 31	**Guest speaker:** Mark Doneaux, Capitol Region Watershed District Administrator
Feb 2	**Environmental communications**: Concept maps and problem statements, how to conduct an informational interview
Feb 7	**Team product work:** Writing a problem statement
Feb 9	**Team product presentations:** Stormwater management problem statements
Feb 14	**Field Trip #1 of 3 options (pick one):** District Energy
Module #2: Defining Problems	
A case study will be presented that progressively becomes more complicated with identification of new stakeholders, how the problem is defined, and expected solutions. Student teams will use the skills learned in the previous module and practice asking and framing questions in the larger scientific and societal contexts. Teams will compare to identify differences in how problems are organized and disciplinary contributions to problem resolution. **Case Study Topic: Land use, nutrient management and eutrophication**	
Feb 16	**Team building:**
Feb 21	**The problem of eutrophication:** Case study presentation, peer assessment
Feb 23	**The process of problem definition:**
Feb 28	**Guest speakers: TBD**
Mar 2	**Environmental communications:** Posters and factsheets
Mar 7	**Team product work:** Designing an effective poster
Mar 9	**Team Product Presentations:** Poster symposium
	****Exam #1 due:** Reflection on Your Professional Development**
****Spring Break! No Classes Mar 13-17****	
Module #3: Exploring Solutions	
In this module teams will continue developing skills in integrated problem solving. Teams will begin to learn how to assess the quality of information brought to bear on resolution of a problem and the ambiguous nature of environmental issues. Teams will coordinate collecting	

and analyzing data relating to a complex environmental problem. Students will contribute, document, and evaluate disciplinary knowledge observing the value to the selected problem. **Case Study Topic: Invasive Species**	
Mar 21	**Team building:** Ethical Dilemmas in Environmental Problem Solving
Mar 23	**The problem of Invasive Species:** Case study presentation**,** peer assessment **Forming Scientific Questions (that can be answered with data!)** Biophysical Science and Social Science
Mar 28	**The process of problem solving:** Problem analysis, professional interviews discussion
Mar 30	**Guest Speakers: TBD**
Apr 4	**Environmental communications:** Oral presentations
Apr 6	**Problem solving:** Science, policy and management outcomes
Apr 11	**Team product work:** Designing and delivering an oral presentation
Apr 13	**Team Product Presentations #1:** Oral presentations
Apr 18	**Team Product Presentations #2:** Oral presentations
Apr 20	**Team Product Presentations #3:** Oral presentations
Module #4: Integration	
Apr 25	**Reflection:** Team products and professional interviews, peer assessment
Apr 27	**Field Trip #2 of 3 options (pick one):** Earthworm monitoring
May 2	**Field Trip #3 of 3 options (pick one):** Onsite park/trail visitor surveying
May 4	**Course Wrap-up:** course debriefing and evaluation,
	****Exam #2 due:** Your Philosophy of Problem Solving**