ESM 322 Environmental Risk Assessment

Instructor:  
Office:  
Phone:  
Email:  

Office hours  
e-office hours  
Lecture  

Objectives and summary of the course:  
Policy-makers, managers and stakeholders all depend on accurate environmental risk assessment to learn the facts about environmental stressors and their effects on ecosystems. The field of environmental risk assessment has been rapidly evolving to meet such a demand. This course will introduce students the basic framework, concepts and methods of environmental risk assessment with an emphasis on ecological effects on freshwater ecosystems. The topics ranging from laboratory ecotoxicology, field-based bioassessment, to probabilistic risk characterization will be presented under the US EPA’s Ecological Risk Assessment Framework. The students will be expected to apply the framework, critique the relevant literature, and complete an environmental risk assessment project.

Prerequisites: ESM 320/323, ESM 321/324

D2L (https://d2l.pdx.edu/): We will use this on-line learning system to distribute class material such as syllabus, lecture notes, lecture Powerpoint presentations, weekly reading materials, and any last minute changes. Please check it on the regular base for class news and last-minute announcement. Students are encouraged to use “D2L” to post questions, comments, and suggestions.

Approach: Lecture, discussion, literature review, and group project.

Textbook: No required textbook

Recommending reading materials:

Grading:
- Two exams (60%)
- Group project (35%)
- Class participation (5%): Class participation includes collaboration within each group, class discussion, and on-line discussion

Research Project: The purpose of this research project is to familiar the students with the US EPA’s Ecological Risk assessment framework in environmental risk assessment. Environmental risk assessment demands a team work. Therefore we will divide the class into several groups with 3-4 students. Each group should start their project immediately. To distribute the work load evenly during the term, the project is broken down into several major tasks with target dates
- Select an environmental stressor of their interest (week 1)
- Review 3-4 key literature on the stressor (week 2)
- Develop a conceptual model with a risk hypothesis (week 3, submission)
- Select a system which the risk assessment will be performed upon (week 3)
- Search for the data in the literature or websites to perform both exposure and effects analysis (week 4 & 5, submission)
- Characterize its environmental risk (week 6)
- Summarize uncertainty of the risk assessment (week 7)

To get more input from both peers and instructor, each group will submit their work weekly and prepare for class discussion. A complete draft report, following a journal-style format, will be due on Sunday of week 7. Each report will be reviewed by both the peers and the instructor and after revising the draft, the final report will be due on Sunday of week 9. More information on the paper such as format can be found in a separate document.

### Tentative Course Outline

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<tr>
<th>Week</th>
<th>Topic</th>
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<tr>
<td>1</td>
<td>Ecosystem Structure and Function; Goods and Services; Stress Ecology Purpose and Types of Risk Assessment; Causal analysis; Decision Making</td>
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<td>2</td>
<td>US EPA Ecological Risk Assessment Framework Case Study: Ecological Risk Assessment of Atrazine</td>
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<td>3</td>
<td>Planning and Problem Formulation; Assessment Endpoints Conceptual Models; Analysis Plans</td>
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<td>4</td>
<td>Analysis of Exposure Analysis of Effects</td>
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<td>5</td>
<td>Risk Characterization Characterizing Variability, Uncertainty, and Incomplete Knowledge</td>
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<td>6</td>
<td><strong>Exam I</strong> Tiered Assessment Strategy; Revisit Atrazine</td>
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<td>7</td>
<td>Field Assessment: Concepts Field Assessment: Study Designs</td>
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<td>8</td>
<td>Watershed &amp; Physical Habitat Characterization Water Quality Assessment</td>
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<td>9</td>
<td>Sampling Biota (Periphyton, Macroinvertebrates, and Fish) Bioassessment; Multimetric Biotic Indices; Multivariate Models</td>
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<td>10</td>
<td>Water Quality Management: the TMDL Approach Valuing Ecological Resources: Stream/River Law</td>
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<td>11</td>
<td><strong>Exam II</strong></td>
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