FRSHWTR 822
ENVIRONMENTAL HEALTH OF FRESHWATER ECOSYSTEMS

Instructor: Michael J. Carvan, PhD
School of Freshwater Sciences
Room 2013
414-382-1706

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Email and office availability:
Please note that I am generally responsive to emails during normal business hours of 9 am--5 pm weekdays. You can generally expect a response within 24 hours. I may check my email at other times however you should not expect to receive an answer to any emails received after 5 pm until the next weekday. I am available to meet in person, over the phone or Skype, by appointment.

Course format:
This course will be presented in seven bi-weekly sections taught entirely online through the UWM D2L website (http://d2l.uwm.edu). This course is offered in an online format to provide students structured flexibility to allow you to do the required work when you have time to do so but in a format that provides guidance through the material and interaction with me as the instructor as well as your classmates. Online courses can be engaging but please realize that managing your time is very important. You will need to log into the course 3-5 times a week to review the syllabus and bi-weekly assignments and to connect with the material and your classmates. A scheduled list of activities for each week will be posted on the D2L site for this class which you should see if you are registered and log into the website. You will have several activities including lecture materials to view, readings, discussions, quizzes, and projects due through this website. Each activity will have a set time limit for starting and completion to guide you through the course timeline for the semester. For question about accessing or working in D2L please contact the UWM Help Desk before contacting me as they will most likely be more helpful to you and will answer faster than I can. You can reach them at (414) 229-4040 or (877) 381-3459 (toll free).

Course description and learning objectives:
Environmental Health of Freshwater Ecosystems is designed to give graduate students and advanced undergraduate students an integrated, holistic understanding of the influences of human induced and naturally occurring environmental change on the health of freshwater ecosystems and humans who interact with these systems. Examples will be provided to illustrate relevant contemporary issues and serve as case studies for knowledge acquisition.
The course is designed such that students will:

- Develop an understanding of how human induced environmental changes impact the health of aquatic ecosystems at the molecular, cellular, organismal, and population level;
- Become familiar with the techniques used to assess the health of individuals and populations of aquatic organisms, and with the principles governing such measurements;
- Gain knowledge of contaminants, environmental regulations and how assessments are conducted to determine risk of these contaminants

At the completion of this course, students should be able to:

- Understand specific mechanisms of toxicity for legacy and emerging contaminants as well as how their potential risks are assessed
- Analyze and interpret data that deals with the assessment of environmental health, degradation, or hazards;
- Think critically and explain the issues behind many of the environmental changes that are influencing the freshwater ecosystems worldwide;
- Evaluate the complex problems associated with the concurrent changes resulting from urbanization, global climate change, invasive species, and land/water use, as well as contaminants and current strategies for remediating their effects.

**Required text:**

*Essentials of Environmental Health*. Second Edition. Robert H. Friis. Jones & Bartlett Learning Publishers. This text has a Public Health focus but the concepts are equally applicable to ecosystem health. You must activate your online account to have access to companion online content.

Additional reading assignments will be posted to the course Desire2Learn (D2L) site.
Student expectations and responsibilities:

- As this class is fully online, it is dependent on everyone’s commitment to participating fully and thoughtfully in discussion. As a general rule, always treat people the way you want to be treated in discussions.
- As a student in this course you should challenge yourself to learn new things and take what you have learned and apply it to other things you know or have learned. In discussions, you should challenge yourself to think and present complex ideas that also creates an interactive and advanced learning environment for your fellow classmates.
- Because this is an online course, you have far more responsibility for ensuring your adequate course progress than in a typical face-to-face course. You will be given a certain amount of flexibility in completing course requirements.

***It is your responsibility to read this syllabus completely to be aware of due dates and course policies. Although the instructor may remind you of some important deadlines, it is your responsibility to complete all work in this course on time.

- This course contains at least as much content as a face-to-face course would, so be aware that this course should be equivalent to the normal hours of in class and out of class time spent on learning material.
- For online discussions, your writing is key and you do not want to be taken the wrong way. Make sure to use correct grammar, spelling, and netiquette.
- Plagiarism of other students or work of others in the scientific community will not be tolerated. Plagiarism will result in failing the assignment, receiving a lower letter grade in the course, or failing the course all together.
- Students are expected to do the assigned work including viewing content, conducting bi-weekly readings, take bi-weekly quizzes on time, contribute meaningfully to class discussions, and complete all written assignments on time.
- This is a graduate level course so if you do not understand a topic you are expected to go and seek out other material to help you understand the concept presented, a term you do not understand, background material for more information. Of course, you are also always able to contact me via D2L, email or phone and ask for clarification or to set up an appointment for more instruction.
- Students are expected to take primary responsibility for their performance in this course and are strongly encouraged to contact the instructor with questions about course content, format, or instructions.
<table>
<thead>
<tr>
<th>Section</th>
<th>Start Date</th>
<th>Topics, Readings (or viewings), Assessments</th>
</tr>
</thead>
</table>
| 1       | 1/22       | **Topic:** What is Environmental Health?  
Principles in Toxicology  
**Readings:** D2L videos, Chapters 1-3, Complementary article,  
Journal articles  
**Assessment:** D2L quiz, (Optional chapter quizzes), Discussion participation |
| 2       | 2/5        | **Topic:** How do chemicals cause effects?  
Uptake, transformation, damage  
**Readings:** D2L videos, Complementary book chapter, Journal articles  
**Assessment:** D2L quiz, Problem set #1 |
| 3       | 2/19       | **Topic:** Ecotoxicology, measuring the health of the environment;  
Chemicals and their impacts--PCBs and POPs (organics), Great Lakes Areas of Concern  
**Readings:** D2L videos, Chapter 9 and 10, Journal articles  
**Assessment:** D2L quiz, (Optional chapter quiz), Discussion participation |
| 4       | 3/5        | **Topic:** Sources and effects of heavy metals  
Examining risk at a site and cleanup ideas  
**Readings:** D2L videos, Chapter 6 and 12, Journal articles  
**Assessment:** D2L quiz, (Optional chapter quiz), Problem set #2 |
|         |            | **Spring Break** |
| 5       | 3/26       | **Topic:** Regulations and Risk Assessment  
**Readings:** D2L videos, Chapter 4, Regulatory documents  
**Assessment:** D2L quiz (Optional chapter quiz), Problem set #3 |
| 6       | 4/9        | **Topic:** Chemicals—Effects of pesticides, emerging contaminants (pharmaceuticals, endocrine disruptors, nanoparticles)  
**Readings:** D2L videos, Chapter 7, Journal articles  
**Assessment:** D2L quiz, (Optional chapter quiz), Discussion participation |
| 7       | 4/23       | **Topic:** Other stressors—Bacteria and viruses, Urbanization, habitat loss, invasive species, climate change  
**Readings:** D2L videos, Regulatory documents, journal articles  
**Assessment:** D2L quiz, Discussion participation |
| Final   | 5/7        | **Assessment:** Grant proposal or Site assessment or final exam (undergraduates) **due May 10** |
Assessment:

Final course grade will depend on your performance in each of the following areas. Late assignments will not be accepted.

<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>Assignment</th>
<th>Graduate</th>
<th>Undergraduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate understanding of course concepts</td>
<td>Quizzes</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Demonstrate ability to apply concepts learned</td>
<td>Problem sets</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Demonstrate ability to evaluate and critically examine concepts</td>
<td>Discussion</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Creating plan for analyzing problem</td>
<td>Proposal topic and outline</td>
<td>5%</td>
<td>---</td>
</tr>
<tr>
<td>Designing plan to evaluate and analyze problem dealing with Freshwater Environmental Health</td>
<td>Proposal</td>
<td>20%</td>
<td>---</td>
</tr>
<tr>
<td>Demonstrate ability to evaluate and critically examine concepts</td>
<td>Final Exam</td>
<td>---</td>
<td>25%</td>
</tr>
</tbody>
</table>

Bi-weekly Quizzes:

- There will be a quiz most topic modules during the semester that will cover the D2L powerpoint videos or other material as well as the chapters. Quizzes will be taken in D2L.
- Quizzes will be multiple choice and true/false and you will receive an immediate grade.
- You can take the quiz for that week whenever you like only the week assigned starting Monday morning but they need to be completed by Sunday at 11:59 pm Central Time. No make-ups are allowed After this time you will receive a 0.
- Once you start the quiz you will have 20 minutes to complete it. You can take the quiz only once and you must save your answers after each question to ensure that they are recorded.
- Optional—You may also take the book chapter quizzes, submitted to me by email with the same deadline as above (Sunday at 11:59 pm Central Time). These are open-book essay quizzes. You can substitute this quiz grade if it is higher than the one you earned on the D2L quiz.
Problem Sets:
There will be three problem sets during the semester. They are designed to help you to take the materials you are learning in the course and use them towards real world examples. In this way, you will be able to see the application of some of the key concepts and develop an understanding of their importance in relation to freshwater health. You are welcome to work with others on the problem sets but the writing or calculations for the assignment that is turned into the instructor must be your own. I have also created a discussion forum associated with each problem set for students to discuss their thoughts and questions as they work on the problem set and I will participate in this discussion if requested. Problem sets are due by Sunday at 11:59 pm CST into DropBox on the D2L site. Late assignments will be docked 10% for every hour they are late.

Online Discussions:
A leading statement or question for each discussion assignment will be posted on D2L. All students must post at least one comment per thread regarding the content material (e.g., readings, videos, etc.) by Wednesday of that week. You will be required to post at least two more substantive messages in each of the two discussion threads by that Sunday. Messages should not be posted all at once to promote discussion. A message should be written clearly with a point of view and be a least 200 words that contains ideas from the readings and/or personal experience. Discussions will be graded on a 20-point scale. You will receive one point for every comment post (up to 4 points) and then the quality of the posts will be graded on a four-point scale (up to 16 points).
   4 = substantive that is at least 200 words and contains ideas from readings or personal experience
   3 = 200 words that does not draw from readings or personal experience
   2 = shorter answer that only provides minimal background
   1 = short answer without thought
   0 = did not post
Posts will be accepted until Sunday 11:59 pm CST. Late posts will not be accepted.

Proposal (Graduate Students only):
Ph.D and M.S. students: Thesis graduate students will be required to identify a research project with a focus on freshwater environmental health based on some of the topics covered in the course. Students will produce a written NIH or NSF style research proposal that incorporates their individual areas of expertise and interest. This should follow the guidelines for either a dissertation improvement grant (DIG) or an NIH R01 grant style. The grant should include an abstract, introduction to background material, identification of broader impacts and innovative aspects, hypotheses to be tested, methods, anticipated results as well as a reference section. Equipment and budget aspects are not needed. A proposal topic and outline of the proposal will be due weeks before the actual proposal is due so the instructor can provide feedback to the student. Format for these documents is provided in D2L.
Professional Science students and non-degree seeking students: PSM students have the option to create a proposal similar to a portion of an EPA Brownfields redevelopment grant. This involves identifying a town and sites that need to be redeveloped, conducting research on the sites mentioned as to their past history and potential contamination profiles, researching potential cleanup strategies, describing potential uses and benefits of the site. A proposed site and proposal outline will be due weeks before the actual proposal is due so the instructor can provide feedback to the student. Format for this proposal will be in D2L as a separate document.

The final proposals or projects for all students are due Thursday, May 10 at 11:59 PM CST in the folder in Dropbox. Late proposals will be docked 10% for every hour they are late. No extensions will be given past the due date.

Final Exam (Undergraduates only)
Undergraduates will have the option to take a final exam versus writing a proposal project. The exam will be comprehensive, cover many of the topics of the course, and will require analysis and critical examination of the concepts presented. This will be an essay exam and you will have one day to complete it once it has started. The final exam will be required to be deposited in the site on D2L by 11:59 PM the day of the exam.

Time Commitment:
On average, students should expect to make the following minimum time commitment in this course:

<table>
<thead>
<tr>
<th>Course element</th>
<th>Grad</th>
<th>Undergrad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readings, slides</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Studying and taking quiz</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Discussions</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Problem sets</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Developing Proposal topic and outline</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Researching and writing Proposal</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Studying and taking Final Exam</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Estimated Total semester commitment</td>
<td>137</td>
<td>117</td>
</tr>
<tr>
<td>Average per week</td>
<td>9.1</td>
<td>7.8</td>
</tr>
</tbody>
</table>

You should plan to devote approximately 9 hours a week to this course. Keep in mind that more time may be required to adequately read material and prepare for quizzes, problem sets, and exams than is estimated in this chart.
University Policies
Other general campus policies that apply to this course are listed on the Secretary of the University's web site: following University policies: http://uwm.edu/secu/syllabus-links/. This includes information and participation by students with disabilities, accommodation for religious observances, complaint procedures, grade appeal procedures, and other standing policies.

Students with Disabilities:
If you have a documented disability and need special accommodations in order to meet course requirements please contact the instructor. You will need to provide your VISA form which you can obtain at the Student Accessibility Center. Mitchell Hall, Room 112, (414) 229-6287, http://www4.uwm.edu/sac/.

Academic Misconduct:
This course will adhere to UWM's policy regarding academic misconduct. UWM does not tolerate cheating, plagiarism and any student caught will be given a zero for that exam or quiz and risk removal from the course. Students are responsible for taking their own quizzes and exams without assistance from any other person either in or out of the course and unless specifically stated they are not allowed to use notes. More information can be found at http://www4.uwm.edu/Dept/Acad_Aff/policy/academicmisconduct.cfm.