Environmental Chemicals: Exposure, Transport and Fate

NRES 433/633

Instructor: Mae Sexauer Gustin mgustin@cabnr.unr.edu FA 126 Office hours: by appointment.

Teaching Assistant: Kerri Minatre Kerri.Minatre@dri.edu FA 128 Office hours: 12:00-1:00 Tuesday/Thursday

Graduate students: I hour each week in FA 128. Times will be allocated.

Location and time: PE 102 2:30-3:45 MW

Book: Chemical Fate and Transport in the Environment by Harold Hemond and Elizabeth Fechner 2015 3rd Edition

Prerequisite(s): Students must have completed two semesters of chemistry and calculus. A semester of organic chemistry is useful.

Students will be introduced to the fundamental principles of contaminant mass transport, chemical partitioning, and chemical/biological transformations in surface waters, soil and groundwater, and the atmosphere.

This course will provide a foundation for students that will need to understand movement of contaminants in the water, atmosphere, and soil, and man-made or impacted systems. The topics included are highly relevant to society in general, given we live in a world that has a multitude of contaminants that effect human, wildlife, and ecosystem health.

We will focus on the following specific themes from the text: 1) Principles in environmental chemistry, 2) Thermodynamics, 3) Chemical distribution among phases, 4) Biotransformations/biodegradation, 5) Abiotic chemical transformations, 6) Physical transport mechanisms, and 7) Atmospheric transport.

Attendance: My expectations are to present material to students who in turn attend class, are punctual, and participate during lecture. Exam material will be taken from the textbook and from lecture material, thus **attendance is required**. In case of absence, students will take the responsibility to find out what was covered and will be responsible for that material on exams and quizzes.

Assessments:

Reading – Plan to read assignments in advance. The readings assignments contain more information than presented in class. Exam questions will be taken from both the readings and from lecture material and discussions.

Homework Assignments – There will be 4 homework assignments throughout the semester. These will allow for assessment of student comprehension of the reading and lecture materials. Each assignment will be worth 50 points. The assignments will be handed out and discussed in class 1-2 weeks prior to their due date. Hard copies of assignments will be due at the start of the lecture on the date they are due.

Exams – Three (3) 1-hour exams (in class) each worth 100 points.

Undergraduate Grading: The final grade will be calculated as follows:

Homework (33%)	4 x 50 points each = 200 points
Exams (66%)	3 x 100 points each = 300 points
	Total = 500 points

Letter grades will be determined using the typical scale: A (100-90%), B (89.9-80%), C (79.9-70%), D (69.9-60%), F (≤ 59.9%). In the event that a grade falls right at a grade border, attendance and classroom participation will be the deciding factor for which grade a student receives.

Graduate student requirements:

Graduate students will be divided up into groups representing surface waters, the subsurface environment, and the atmosphere.

Once they are assigned a group they will be required to help undergraduate students with homework for that topic and working the problems in the book.

In addition, they will write a paper and give a 45-minute presentation on the behavior of a contaminant within the topic chosen.

Graduate student grading: The final grade will be calculated as follows:

Homework (33%)	4 x 50 points each = 200 points
Exams (66%)	3 x 100 points each = 300 points
Paper and presentation	100 points
Helping undergraduates with homework	50 points
	Total = 650 points

Additional Policies:

No late work will be accepted. If you know you will be absent and will not be able to turn in an assignment, please let me know as soon as possible. Only under extenuating circumstances will late work be considered, and only on a case-by-case basis.

No cell phones in class, including texting. If I see you texting in class, I will ask you to leave class for the remainder of the lecture. Texting is distracting to other students, to the instructor, and most likely impedes your ability to absorb information in class.

Week: Readings	**Monday**	**Wednesday**
1: Chapter 1, Handouts		**1/22:** Welcome/Introduction, Syllabus Review of Chemical Concepts
2: Chapter 1, Handouts	**1/27:** Review of Chemical Concepts ***Posted:*** *Homework 1*	**1/29:** Review of Chemical Concepts
3: Chapter 1, Handouts	**2/3:** Review of Chemical Concepts	**2/5:** Review of Chemical Concepts
4: -	**2/10:** Contaminants and surface water ***Due:*** *Homework 1*	**2/12: ** Exam 1 **** (1/22 – 2/7)
5: Chapter 2, Handouts	**2/17:** No class President's day	**2/19:** Contaminants & Surface Waters
6: Chapter 2, Handouts	**2/24:** Contaminants & Surface Waters ***Posted:*** *Homework 2*	**2/26:** Contaminants & Surface Waters
7: Chapter 2, Handouts	**3/2:** Contaminants & Surface Waters	**3/4:** Contaminants & Surface Waters- 1 graduate student presentation
8: -Chapter 2	**3/9:** Two graduate student presentations ***Due:*** *Homework 2*	**3/11: ** Exam 2 **** (2/19 – 3/7)
9:	**3/14-3/22: Spring Break**	
10: Chapter 3, Handouts	**3/30:** Contaminants & The Subsurface	**4/1:** Contaminants & The Subsurface ***Posted:*** *Homework 3*
11: Chapter 3, Handouts	**4/6:** Contaminants & The Atmosphere	**4/8:** Contaminants & The Atmosphere

12: Chapter 3, Handouts	**4/13:** Contaminants & The Atmosphere ***Due:*** *Homework 3* ***Posted:*** *Homework 4/* *1 graduate student presentation*	**4/15:** Graduate student presentations
13: -	**4/20:** Contaminants & The Atmosphere	**4/22** Contaminants & The Atmosphere
14: Chapter 4, Handouts	**4/27:** Contaminants & The Atmosphere	**4/29:** Graduate student presentations ***Due:*** *Homework 4*
15: Chapter 4, Handouts	**5/4:** Exam 3	**5/6 Dead Day**

Student Learning Objectives:

1) Be able to think critically and creatively

2) Have knowledge of the natural world and an understanding of the scientific method.

3) Provide a framework for critically assessing environment pollution related issues and problem solving.

4) Quantitative problem solving. **A basic understanding of chemistry and calculus are required for this course.**