Lecture MWF 11:00-11:50 in CBB 101

Instructor: Daniel Keymer
Office: TNR 267
Email: dkeymer@uwsp.edu (preferred)
Phone: 715-346-2616
Office Hours: Mon. 2-3 PM, Wed. 3-4 PM, or by appt.

I. Course description:
Tens of thousands of organic chemicals are used in commerce in the United States, and most of these compounds will enter the environment through managed or unmanaged waste streams. To assess the effects of these chemicals on natural resources and the health of humans as well as ecosystems, one must understand how different groups of these chemicals are likely to behave, move, and persist. This course will provide students with conceptual and quantitative tools to predict how susceptible different chemicals will be to physical, chemical, and biological transformations based on chemical structures and basic properties. Example compounds will include legacy pollutants such as petroleum hydrocarbons, chlorinated solvents, PCBs, and pesticides as well as emerging contaminants such as PFAS and pharmaceuticals. We will discuss the mechanisms that some microorganisms use to transform contaminants, investigate the factors that affect the movement and biodegradability of contaminants in soil and groundwater, and evaluate possible interventions in specific case studies.

II. Learning Objectives:
By the end of this course, students will be able to:

1. Quantify relationships that link chemical fate and transport with chemical and physical properties of contaminants and the natural environment.

2. Describe the conditions in soils, sediments, surface waters, and groundwaters that influence biochemical and photochemical transformations of organic chemicals.

3. Propose strategies for how the effects of certain organic chemicals on human and environmental health may be mitigated.

III. Course Format:
This course contains three 50-minute lecture periods each week. Typically, lecture periods will alternate between conceptual introduction of topics, discussion of case studies, work through example problems, and small group activities.

Attendance policy
If you cannot attend a scheduled class session or will be excessively tardy (>5 minutes late), you must have an excused absence to be eligible for any points awarded during the missed class. Excused absences will be considered by Dr. Keymer on a case-by-case basis. It is your responsibility to contact Dr. Keymer at least one week prior to an absence if you have a scheduled conflict that cannot be moved. Illness related absences must be excused by a doctor's note. For other unforeseen

circumstances resulting in a missed class, Dr. Keymer must be contacted within 36 hours to arrange for any make-up activity. For both excused and unexcused absences, the student is responsible for reviewing all covered material and announcements with Dr. Keymer or his/her classmates.

Expectations
My expectations for you are that you will respect others, take responsibility for your own learning, participate and ask questions, and maintain a safe working environment. All communication with instructors or classmates must be respectful in content and tone. The classroom must be an environment where everyone feels comfortable and able to learn. Accordingly, students are required to treat others with respect and any behavior that impedes the ability of other students to learn will not be tolerated. Such disrespectful behavior includes, but is not limited to, talking out of turn, using tobacco products in class, and using electronic devices for non-class related activity. Students are expected to come prepared to class, ready to begin exercises that draw on material in assigned readings. Assignments must be completed before arriving in class on the day they are due. Unless specified otherwise, late assignments will receive a 10% point reduction per day.

As your instructor, you can expect Dr. Keymer to do everything in his power to be fair, to be available and willing to help you, to provide feedback on work in a timely manner, to relate tasks to real-world skills, and to ask you to think.

In addition to the specific expectations outlined above, all participants in the course are expected to act in accordance with the UWSP Rights and Responsibilities document. For more information, see the following link: https://www.uwsp.edu/dos/Pages/Student-Conduct.aspx.

Regrade requests
Requests for regrading any assignment or exam must be submitted to Dr. Keymer in writing within one week of the graded item being returned.

IV. Course Requirements

Required textbook
Environmental Organic Chemistry, Third Edition by Schwarzenbach, Gschwend, and Imboden (2017) Wiley, Hoboken, NJ.

Supplemental materials
Additional readings and resources will be disseminated via Canvas. Lecture slides will usually be posted prior to lecture. Handouts, homework assignments, practice problems, and announcements may also be made available through Canvas, email, or in class.

Exams
Four exams will assess student understanding of the material covered in class. The fourth exam will not be comprehensive, but may build on material covered on the first three exams. The fourth exam will be administered during the scheduled exam period (Monday, May 13th from 8:00 to 10:00 AM).

Independent project
Students in this course will be required to construct an illustrative handout on a specific organic chemical case study to apply concepts and tools learned in class. Specific instructions and expectations will be provided when Dr. Keymer introduces the project in class.

Point distribution
Student grades will be determined based on the following breakdown of points:

Assignments	30%
Project	10%
Exams	60%
Total	**100%**

Dr. Keymer may also offer extra credit opportunities at his discretion.

Grading scale
Letter grade assignments will be made according to the following scale:

A	= 93 – 100%	C+	= 77 – 79%
A-	= 90 – 92%	C	= 73 – 76%
B+	= 87 – 89%	C-	= 70 – 72%
B	= 83 – 86%	D	= 60 – 69%
B-	= 80 – 82%	F	= below 60%

V. Academic Integrity

All students have agreed to the UWSP Code of Conduct and are expected to know and abide by the rules documented therein. The policy can be found through the Division of Student Affairs (https://www.uwsp.edu/dos/Documents/UWS%2014-1.pdf). This includes knowing the difference between plagiarism and paraphrasing, whether summarizing someone else's work in writing or on presentation slides. Individual student work submitted for credit will be your own and not submitted for credit in another course.

Working in groups is encouraged and required for parts of this course. This does not include exams and any collaboration among students on an exam is strictly forbidden. Appropriate credit must be given to all authors of assignments submitted for credit and the specific contributions of each author should be stated. It is assumed that students attaching their name to a group assignment have been responsible for a substantial contribution to its completion. Dr. Keymer should be notified if you are aware of any student taking credit for someone else's work. Violation of this policy could lead to failure on the assignment/exam, failure of the course, or other disciplinary action at the University level.

VI. Academic Accommodations

Accommodations for students with disabilities will be made on an individualized basis. Students must register with Disability and Assistive Technology Center to identify and confirm appropriate accommodations. Dr. Keymer will be happy to accommodate, but must be notified of any documented accommodations during the first three weeks of the semester, so that satisfactory arrangements may be provided. Please notify Dr. Keymer immediately if unusual circumstances arise during the semester that change your accommodation needs.

VII. Anticipated Course Schedule: (*Subject to change*)

Week#	Dates	Topics	Textbook pages
1	1/22-1/24	Course overview, environmental fate framework	2-14, 47-48
2	1/27-1/31	Properties of contaminants, dissolution	20-30, 37-40, 69-71, 220-221, 225, 98-106, 261-270
3	2/03-2/07	Volatilization, mass transfer, diffusion, sorption	238-246, 335-339, 534-548, 583-592, 371-378, 385-388
4	2/10-2/14	Equilibrium partitioning (fugacity), bioaccumulation	83-98, 471-477, 485-488, 495-502
5	2/17-2/21	**Exam 1 (2/17),** Mass balances	167-186
6	2/24-2/28	Contaminant fate models, transformations, hydrolysis	952-955, 638-643, 665-673
7	3/02-3/06	Photolysis, redox transformations, electron acceptor demand	775-788, 803-804, 816-819, 828-829, 716-730
8	3/09-3/13	Biodegradation, **Exam 2 (3/13)**	650-652, 847-865
9	3/16-3/20	NO CLASS (SPRING BREAK)	
10	3/23-3/27	Toxicity	63-68, 503-506
11	3/30-4/03	Fate in wastewater treatment	
12	4/06-4/10	Petroleum hydrocarbons	48-53
13	4/13-4/17	Soil remediation, **Exam 3 (4/15)**	
14	4/20-4/24	Contaminant transport in groundwater	148-154
15	4/27-5/01	Groundwater remediation, halogenated solvents	53-56
16	5/04-5/08	Emerging contaminants	56-62
17	**5/11**	**Exam 4**	