

Lecture Tuesdays 9:00-10:50 in WEC 110
Discussion Thursdays 9:00-9:50 in WEC 110

Instructor: Daniel Keymer
Office: TNR 267
Email: dkeymer@uwsp.edu (preferred)
Phone: 715-346-2616
Office Hours: Mon. 9:30-10:30 AM, Tue. 2-3 PM, or by appt.

I. Course description:

Past and present anthropogenic activities have introduced a multitude of undesirable contaminants into our environment. To protect our natural resources and the health of humans as well as ecosystems, contaminated soils and groundwater must often be treated using a variety of remediation techniques. This course will focus on microbial processes that can be harnessed and promoted to achieve contaminant reduction or stabilization. In particular, 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 contaminant fate and transport with chemical and physical properties of contaminants and contaminated sites.
2. Describe the conditions in contaminated soil and groundwater that influence microbial activity and the success of desired bioremediation strategies.
3. Propose relevant techniques to bioremediate soils and groundwater in a variety of scenarios involving mixtures of traditional and emerging contaminants.

III. Course Format:

This course contains one 2-hour lecture period and one hour of discussion each week. Typically, lecture periods will be used to introduce topics and work through example problems, while discussion periods will be used for 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

Course materials

There is no required textbook for this class. Assigned readings from various sources will be disseminated via D2L. Lecture slides will usually be posted by 6 PM on Mondays. Handouts, homework assignments, practice problems, and announcements may also be made available through email or D2L.

Quizzes and Exams

Four quizzes and two exams will assess student understanding of the material covered in class. The final exam will be a comprehensive written exam, but will focus primarily on material discussed during the second half of the course. The final exam will be administered during the scheduled exam period (Monday, May 13th from 8:00 to 10:00 AM).

Group presentation and handout

Students in this course will be required to complete a short group presentation (10-15 minutes) on a specific bioremediation case study. One group summary fact sheet on the same topic will be turned in to Dr. Keymer within one week following the presentation. 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	35%
Quizzes (drop one)	9%
Midterm exam	15%
Group presentation/fact sheet	15%
Final exam	20%
Participation	6%
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
1	1/22-1/24	Course overview, bioremediation terms and requirements
2	1/29-1/31	Properties of contaminants, temperature dependence
3	2/05-2/07	Stoichiometry, electron acceptor demand
4	2/12-2/14	Quiz 1 , Mass balances
5	2/19-2/21	Contaminant partitioning among phases (fugacity)
6	2/26-2/28	Quiz 2 , Contaminant fate models
7	3/05-3/07	Biodegradation rates
8	3/12-3/14	Midterm exam (3/13) , Project description
9	SPRING BREAK	NO CLASS
10	3/26-3/28	Mass transfer, diffusion, fate in wastewater treatment
11	4/02-4/04	Contaminant transport in soils and groundwater
12	4/09-4/11	Quiz 3 , Bioremediation technologies
13	4/16-4/18	Bioremediation technologies, <i>Group presentations</i>
14	4/23-4/25	Quiz 4 , Petroleum hydrocarbons, <i>Group presentations</i>
15	4/30-5/02	Halogenated solvents, <i>Group presentations</i>
16	5/07-5/09	Phytoremediation and heavy metals, <i>Group presentations</i>
17	5/13	Final exam