



ENVENG 5210 Advanced Physical Chemical Treatment Processes

3 credit hours

Spring Semester 2022

Course Offering: T 11:10 am-1:55 pm

Course Location: Journalism Bldg 291

Instructor: Linda K. Weavers (weavers.1@osu.edu, 614-292-4061)

Office hours: M 10-11 am (in person and on Zoom), F 2-3 pm (Zoom only), or by appointment
(M/F [CarmenZoom](#), Meeting ID: 964 0341 3301, pwd: Weavers or M 417F HI)

Course overview

Prerequisites

ENVENG 3210 or graduate standing in engineering, or permission of instructor.

Course description

Principles and design of physical and chemical processes for water and wastewater treatment including mixing, mass transfer, chemical kinetics, oxidation-reduction, disinfection, emerging contaminants, and water reuse.

Course learning outcomes

The expected learning objectives that should be achieved by the end of the course are:

- Make basic engineering calculations related to physical chemical treatment processes covered
- Know relevant environmental regulations
- Critically analyze research articles
- Understand application of studied processes

How this course works

Mode of Delivery

This course will be delivered predominantly in person. Occasionally, we may need to have a lecture via CarmenZoom. During both paper reviews sessions and presentations there is an expectation that you will actively participate in discussions, and that you will ask relevant questions of the presenter. If you have a situation that might cause you to miss class, discuss it with me as soon as possible. I will do my best to accommodate all situations.

Pace of course activities

This course is divided into approximately weekly modules, that will be synchronous (i.e., in-person or live on CarmenZoom) in nature. Students are expected to keep pace with course material throughout the semester.

A typical module will proceed as follows:

- We will meet **synchronously (in person or online)** for lectures in which new information will be presented.
- **Readings:** I list chapters associated with lectures but want you to focus on content we discuss in class and do not expect you to read all that is listed.
- **Problem sets** will be assigned during the presentation class period and will be due prior to the start of class a week later (i.e., by 11 AM). All written course submissions will be submitted through the Carmen site.
- **Paper reviews** are in a separate module

Credit hours and work expectations

This is a 3-credit-hour course. According to Ohio State policy, students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Course materials

Textbooks

REQUIRED

Water Treatment Principles and Design, MWH, 3rd Edition, 2012 (preferred) or Principles of Water Treatment, MWH, 2012. (This is a cliff notes version of above)

Grading

How your grade is calculated

ASSIGNMENT CATEGORY	PERCENTAGE
Problem Sets	20
Paper Reviews/Presentations	30
Take home Midterm	20

Take home Final	20
Treatment Overview of Emerging Contaminant	10
Total	100

DISCLAIMER: Auto-calculated cumulative grades on Carmen may not reflect actual grades due to differing point assignments and distributions.

Late assignments

Late assignments will not be accepted without prior approval of instructor. Expect a late penalty even if late submission is approved.

Attendance

Attendance is necessary to understand and complete the course. If you have an issue that prohibits you from attending please contact me prior to class so we can figure out a solution.

Grading scale

A	A-	B+	B	B-	C+	C	C-	D+	D	E
93-100	92.9-90	89.9-87	86.9-83	82.9-80	79.9-77	76.9-73	72.9-70	69.9-67	66.9-60	Below 60

Other course policies

Classroom Safety and Respect

CEGE Buckeyes take pride in masking up and physically distancing to protect others in public spaces. As civil and environmental engineers, these actions are part of our professional and ethical responsibility to protect public health and safety.

Health and safety requirements

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

COURSE SCHEDULE (subject to change)

<i>Week</i>	<i>Date</i>	<i>Topic</i>	<i>Reading</i>	<i>Homework</i>
1	Jan. 11	Introduction: Regulations, Risk, Lawyers Characteristics of Water Chem Review	Ch 2 and 3 and websites	
2	Jan. 18	Treatment Processes Overview Kinetics	Ch 1 and 5	4 potential papers to review due PS #1 out
3	Jan. 25	Kinetics (cont.) Reactors	Ch 5-1, 5-4, 5-5	PS #1 due PS#2 out
4	Feb. 1	Reactors (cont.) Mass Transfer	Ch 6 Ch 7	PS #2 due PS #3 out
5	Feb. 8	Aeration and Stripping Oxidation/Reduction		PS #3 due
6	Feb. 15	Oxidation/Reduction Paper review #1: Mass/Gas Transfer	Ch 8	Paper review #1 due PS #4 out
7	Feb. 22	Oxidation/Reduction (cont.)		PS #4 due PS #5 out
8	Mar. 1	Conventional Chemical Oxidants Ozone		PS #5 due
9	Mar. 8	Photolysis Advanced Oxidation Processes	Ch 8-4	Midterm out 3/5 in 3/11
	Mar. 15	Spring Break		
10	Mar. 22	Disinfection: Mech & Kinetics Paper review #2: Oxidation/Reduction		
11	Mar. 29	Disinfection by Chemicals Paper review #3: AOPs		
12	Apr. 5	Disinfection by UV Disinfection/oxidation byproducts		
13	Apr. 12	Ion Exchange/Water Reuse Paper review #4: Disinfection		
14.	Apr. 19	Presentations on Treatment of Emerging Contaminant PFAS, PPCPs, DBPs, Algal toxins		

CARMEN ACCESS

You will need to use [BuckeyePass](#) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](#) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the [Duo Mobile application](#) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.
- If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

COURSE TECHNOLOGY RESOURCES

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

BASELINE TECHNICAL SKILLS FOR ONLINE COURSES

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the [Canvas Student Guide](#).

REQUIRED TECHNOLOGY SKILLS SPECIFIC TO THIS COURSE

- [CarmenZoom virtual meetings](#)

REQUIRED EQUIPMENT

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

REQUIRED SOFTWARE

- [Microsoft Office 365](#): All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Full instructions for downloading and installation can be found [at go.osu.edu/office365help](http://go.osu.edu/office365help).

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Accessibility Accommodations for Students with Disabilities

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [CarmenCanvas accessibility](#)
- Streaming audio and video
- [CarmenZoom accessibility](#)
- Collaborative course tools

Ohio State Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the

university's [Code of Student Conduct](#), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
 - *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
 - *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)
- 1.

Statement on Title IX

All students and employees at Ohio State have the right to work and learn in an environment free from harassment and discrimination based on sex or gender, and the university can arrange interim measures, provide support resources, and explain investigation options, including referral to confidential resources.

If you or someone you know has been harassed or discriminated against based on your sex or gender, including sexual harassment, sexual assault, relationship violence, stalking, or sexual exploitation, you may find information about your rights and options at titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu. Title IX is part of the Office of Institutional Equity (OIE) at Ohio

State, which responds to all bias-motivated incidents of harassment and discrimination, such as race, religion, national origin and disability. For more information on OIE, visit equity.osu.edu or email equity@osu.edu.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you find yourself feeling isolated, anxious or overwhelmed, please know that there are resources to help: ccs.osu.edu. You can reach an on-call counselor when CCS is closed at (614) 292-5766 and 24 hour emergency help is also available through the 24/7 National Prevention Hotline at 1-(800)-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Student Emergency Financial Support

The **Student Advocacy Center** staff members are continuing to serve students during normal business hours and are accepting online appointments.

The **Student Emergency Fund** is available to students who may otherwise be at risk of dropping out of college due to an unexpected financial emergency. If you, or a student you know, are experiencing an unplanned expense, the Student Emergency Fund may be an option. Their office is accepting applications and may be able to award up to \$1,000 to eligible students. [Learn more and apply](#).

The Together As Buckeyes emergency grants program, funded primarily by the federal Coronavirus Aid, Relief and Economic Security (CARES) Act, is available to all students — undergraduate, graduate and professional — through the Student Financial Aid office. To apply for a grant, students need to complete a one-page [Emergency Request form](#) and provide any supporting documentation. The Office of Student Financial Aid will process applications after determining eligibility based on each student's circumstances and guidance from the U.S. Department of Education.

Franklin County Department of Job and Family Services has amended its Prevention, Retention and Contingency Program to provide targeted relief for families impacted by the COVID-19 pandemic. The Franklin County COVID-19 Response PRC Program provides eligible families with \$500 in one-time cash assistance to help address emergent needs and expenses brought about by the public health emergency. Families can [apply online](#) today.

The **Student Wellness Center** offers financial coaching through the Scarlet and Gray Financial nationally recognized peer financial coaching program. Through the program, students will learn about financial goal setting, banking basics, budgeting, credit education, debt repayment education and saving and retirement education. [Learn more](#).

Food Assistance

It's a common idea that pervades American culture: when you're in college, it's simply a rite of passage to sustain yourself on cheap, unhealthy food. We disagree. We highly recommend OSU's Buckeye Food Alliance Lincoln Tower 150 food pantry (<https://www.buckeyefoodalliance.org>) and the MidOhio Foodbank (<https://www.midohiofoodbank.org>).