

Water Pollution Control (CHBE 373)
Fall 2021

Lectures: Tuesday & Thursday 11:00-12:30 (CHBE 101)

Tutorial: Wednesday 4:00-6:00 (CHBE 101)

Instructor: **Dr. Madjid Mohseni (221 CHBE, 822-0047, madjid.mohseni@ubc.ca)**
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Dr. Mohseni's office hours: Tuesday & Thursday (1:00-2:00 pm)
or by appointment

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Course textbook and notes:

There is no single textbook assigned for this course and the slides/notes and materials covered in the class will be provided throughout the term.

In addition to the course notes/slides, students are recommended to refer to the following books which include most of the topics covered in the course.

- 1) Reynolds, T.D. and Richards, P. "Unit Operations and Processes in Environmental Engineering" 2nd ed. (1995).
- 2) Critenden, et al. "Water Treatment: Principles and Design" 3rd edition.
- 3) Metcalf and Eddy, "Wastewater Engineering, Treatment & Reuse", 4th ed., McGraw-Hill (2002).
- 4) Droste, Ronald L. "Theory and Practice of Water and Wastewater Treatment", John Wiley & Sons, New York (1996).

Course delivery: lectures and presentations; and tutorials

Course Description:

Sources, characteristics and treatment techniques for water and wastewater generated from various (industrial and municipal) sources. Emphasis will be on water and wastewater treatment processes, such as disinfection, chemical oxidation, coagulation/flocculation, sedimentation, substrate utilization kinetics, biological wastewater treatment (activated sludge and trickling filters), and resource recovery.

Course Objectives:

To help students

- develop the ability to apply basic understandings of physical, chemical, and biological unit operations and processes commonly used in water and wastewater treatment plants.
- develop an appreciation and general understanding of the social and regulatory aspects of managing and delivering water and the multi-disciplinary nature of the field

Evaluation:

Assignments *	15
Tutorials / Quiz **	15
Mid-term ***	25
Final Exam	45
<hr/> Total	<hr/> 100

- * There will be 4 assignments given throughout the course. Assignments should be submitted, by 5:00 pm PST on or before the due date, through Canvas.
- ** There will be 4 short quizzes throughout the term (during the tutorial sessions). Each quiz will consist of a number of short or multiple choice questions. Tutorial marks will be based on the participation in the session and working on the specific problems during the session.
- *** The mid-term exam will be given on **Wednesday Oct. 27th**. Missing the exams or quizzes due to medical reasons would be accommodated based on the UBC Academic Concession (Policy V135): <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0>

Students who wish to have an academic accommodation because of a disability are advised to contact Centre for Accessibility <<http://https://students.ubc.ca/about-student-services/centre-for-accessibility>>

Final Exam: The final exam will be given during the final exam period (details to be provided later).

CLASS SCHEDULE (tentative - subject to change)

Week 1		Introduction to the Course
	Topics:	Context and scope; water facts, use and consumption
Week 2		Water and Wastewater Characteristics
	Topics:	Water and wastewater quality parameters, classifications of water and wastewater, water quality and pollution
Week 3		Water and Wastewater Characteristics (cont'd) Regulations and overview of water treatment processes
	Topics:	Regulation and policies around water and wastewater
Week 4		Water Microbiology
	Topics:	Microbiological quality of water and wastewater, techniques for microbial assays
Week 5		Physico-chemical treatment
	Topics:	Flow equalization, Coagulation and flocculation
Week 6		Physical treatment - Clarification
	Topics:	Sedimentation
Week 7		Chemical oxidation
	Topics:	Ozone and peroxide based oxidation processes
Week 8		Ion Exchange
	Topics	Theory of adsorption and isotherms; fundamentals and applications of ion exchange
<i>Mid-term exam</i>		
Week 9		Disinfection
	Topics:	Chlorine and ozone and UV
Week 10		Biological Wastewater Treatment
	Topics:	Cell growth, factors affecting biological growth, biodegradation kinetics
Week 11		Biological Wastewater Treatment
	Topics:	Aerated lagoon and activated sludge processes
Week 12		Biological Wastewater Treatment
	Topics:	Fixed film processes
Week 13		Resource recovery
	Topics:	Sludge digestion and energy production