

PHYSICAL AND CHEMICAL TREATMENT PROCESSES, 3 credits

Meets on Thursdays from 6:15pm -9:15pm

Dr. Wenqing Xu

140 Tolentine Hall

(610) 519-8549

E-mail: wenqing.xu@villanova.edu

Office Hours: Monday 10am -noon; or by appointment

Course Material:

Course materials will be uploaded to Villanova Blackboard, including lecture slides and videos, homework assignment and solutions, projects guidelines, and additional reading materials.

Students can access the course website using their Villanova student ID via the link below,

<https://elearning.villanova.edu/webapps/login/>

Required Text: Mark M. Benjamin and Desmond F. Lawler (2013). Water Quality Engineering: Physical/Chemical Treatment Processes

References: Water Treatment Principles and Design; Montgomery Watson Harza (MWH); publisher John Wiley & Sons, N.Y.; Second Edition (2005). ISBN: 0-471-11018-3.

Course Objectives and Prerequisites:

CEE 8707 is designed to help students develop rational bases for the design, interpretation, implementation, and control of physiochemical processes for water quality control. This course emphasizes processes rather than operation. Course prerequisite is CEE 7701 (or equivalent). See the instructor immediately if you have not successfully taken this prerequisite course.

Class Structure and Grading:

Exam I	25%
Exam II	25%
Exam III	25%
Project	25% (Term paper 15% and presentation 10%)
Extra Credits	2%

Grades will be awarded using a scale aimed at measuring student mastery of course material. The following grade “floors” are guaranteed by the instructor: students scoring $\geq 90\%$ are guaranteed to receive at least an A-, 80 – 89% will receive at least a B-, 70 – 79% will receive at least a C.

The instructor will not raise the minimum percentages required to achieve each grade, but may lower them depending on exam grade distributions.

Term Project and Presentation

Each student must submit a term project, which consists of comparing and contrasting different treatment strategies for a chosen water contaminant from the EPA’s Contaminant Candidate List 3 (only one student per contaminant).

Papers should include:

- Background on the sources and health risks of the contaminant
- An analysis of the technical and economical feasibility of treating the chosen contaminant.
- The effects that co-contaminants and non-target water constituents have on the treatability of the chosen contaminant.
- A recommendation of the best available treatment technology for the chosen

contaminant.

- o A thorough bibliography indicating that the literature was adequately reviewed.

Please email me your chosen contaminant no later than January 28th, 2016. Abstracts are due on February 11, 2016, and should be within 200 words in length. Abstracts should include background information on the sources and health risks of the contaminant, and which technologies will be investigated to treat the chosen contaminant. Oral presentations are April 28, 2016 and must be 15-20 minutes in length. Final papers are due April 30, 2016, and must be double-spaced and contain between 2,000-3,000 words excluding the references.

Course Policies:

Reading the assigned book sections prior to the class period is required. Students are responsible for both the material covered in class and reading material that might not be explicitly covered due to class time constraints.

In-class exercises are used to reinforce problem-solving approaches presented during lectures. Students will work in small groups, and it is best if students alternate roles during individual problems. A final number is not always necessary for these problems--a description of the solution process will be acceptable in many cases.

Homework will be assigned and solution will be posted online. Although homework will not be graded, students should compare their homework with the solution to make sure that every aspect of the homework is understood. They are great resources for preparation of your exams.

Exams are **non-cumulative, open book, and open notes**. Students will be on their honor not to use programming functions in their calculators during exams. Exams will take place during the regularly scheduled class period (120 min). Makeup exams will not be granted without prior approval or appropriate documentation for missing the exam.

Villanova Mission Statement

“Villanova University is a Catholic Augustinian community of higher education, committed to excellence and distinction in the discovery, dissemination and application of knowledge. Inspired by the life and teaching of Jesus Christ, the University is grounded in the wisdom of the Catholic intellectual tradition and advances a deeper understanding of the relationship between faith and reason. Villanova emphasizes and celebrates the liberal arts and sciences as foundational to all academic programs. The University community welcomes and respects members of all faiths who seek to nurture a concern for the common good and who share an enthusiasm for the challenge of responsible and productive citizenship in order to build a just and peaceful world.”

Academic Ethics

The strength of the university depends on academic and personal integrity. In this course, you **MUST** be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.

Report any violations you witness to the instructor. For the first offense, a student who violates the Code of Villanova University will receive 0 points for the assignment. The violation will be reported by the instructor to the Dean’s office and recorded in the student’s file. In addition, the student will be expected to complete an education program. For the second offense, the student will be dismissed from the University and the reason noted on the student’s official transcript. You may consult the Code of Academic Integrity of Villanova University using the link below, <https://www1.villanova.edu/villanova/vpaa/studentservices/policies/integrity/code.html>

Academic Accommodation

If you have a diagnosed disability and plan to utilize academic accommodation, please contact Gregory Hannah, advisor to students with disabilities @ 610-519-3209 or visit the office on the second floor of the Connelly Center as soon as possible. The Office of Disability Services collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with physical disabilities the necessary support to successfully complete their education and participate in activities available to all students.

Course Topics (subject to change)

Lecture	Date	Topic	Class Readings
1	1/14	Overview of water and wastewater treatment processes	
2	1/21	Review of reactor hydraulics	Chapter 1&2
3	1/28	Reaction kinetics and mass balance approach	Chapter 3&4
	2/4	Exam I	
4	2/11	Coagulation and flocculation	Chapter 11&12
5	2/18	Gravity separation and type I settling	Chapter 13
6	2/25	Granular Filtration and adsorption	Chapter 14
	3/3	No Class – Spring Break	
7	3/10	Membrane process	
	3/17	Exam II	
	3/24	No Class – Easter Recess	
8	3/31	Redox reactions	Chapter 10
9	4/7	Disinfection and disinfection Byproducts	Chapter 10
10	4/14	TBA	
	4/21	Exam III	
	4/28	Presentation	