

ENVIRONMENTAL ENGINEERING 421/521
Water and Wastewater Characterization
Fall 2013

Class web page: Blackboard

<u>Class Times:</u>	MWF 9:00 - 9:50 (lecture)	STAG 203
	F 12:00 – 1:50 (lab/rec)	Kearney 305
<u>Instructor:</u>	Dr. Tyler Radniecki	e-mail: tyler.radniecki@oregonstate.edu
<u>Office Hours:</u>	M 1 – 3 pm	office: Merryfield 203
	Or by e-mail appointment	
<u>TA:</u>	Tyler Kirkendall	e-mail: kirkendt@onid.orst.edu
<u>Office Hours:</u>	T and Th 1-2pm	office: Kearny 201C*

*Except on Oct. 31, Nov. 12 and Nov. 14

Email:

Every student must have ENGR and ONID accounts. Read email daily. Note: a class email distribution list will be generated from ONID accounts.

Course Description

Measurement of physical and chemical characteristics of water and wastewater.
Engineering principles for the selection and design of treatment processes.

Course Learning Objectives:

By the end of the course, you will be able to:

1. Identify important water pollutants and their environmental significance, and specify appropriate unit processes for the removal or treatment of each.
2. Analyze influent flow rates and constituent loading to determine appropriate values for wastewater treatment plant design.
3. Specify and design appropriate chemical unit operations for treatment of specific water or wastewater contaminants.
4. Use microbial growth parameters to estimate bacterial yields, nutrient and substrate removal and to determine nutrient requirements.
5. Conduct a preliminary design of a wastewater treatment facility including a mass balance on BOD, TSS, nitrogen and phosphorus and communicate the results in a written report.

Required Textbook:

Water and Wastewater Engineering: Design Principles and Practice,
Mackenzie Davis
McGraw Hill, 2011 (ISBN 978-0-07-339786-3)

Lecture Schedule

Dates	Topics	Reading Assignments
Week 1: 9/30 – 10/4	Introduction; Water and wastewater sources and characteristics	Handouts, Ch 1, Ch2, Ch 12
Week 2: 10/7 – 10/11	Coagulation and Flocculation	Ch 3
Week 3: 10/14 – 10/18	Lime-soda softening	Ch 4
Week 4: 10/21 – 10/25	Sedimentation	Ch 7, Ch 18.2
Week 5: 10/28 – 11/1	Primary WW treatment	Ch 14
Week 6: 11/4 – 11/8	Disinfection; Midterm Exam (11/8)	Ch 10, Ch 18.3
Week 7: 11/11 – 11/15	Chemical oxidation; WW microbiology	Handouts, Ch 15
Week 8: 11/18 – 11/22	Wastewater microbiology	Ch 15
Week 9: 11/25 - 11/29	Summary and project work; WWTP Design Projects Due (THANKSGIVING)	Projects due Wed. 11/21
Week 10: 12/2 – 12/6	Graduate Student Presentations (MW); Review (F)	
Final Exam: Th 12/12 2:00	Cumulative	

Recitation/Laboratory Schedule (Friday 12-2pm)

Date	Activity	Reading
Week 1 - 10/4	Recitation: Treatment selection/layout	Ch 1, handouts
Week 2 - 10/11	Recitation: Preliminary design goals	Handouts
Week 3 - 10/18	Chemical oxygen demand (COD)	Handouts
Week 4 - 10/25	WWTP Mass Balances	Handouts
Week 5 - 11/1	Inorganic analyses (N, P)	Handouts
Week 6 - 11/8	Midterm Exam	
Week 7 - 11/15	Recitation: Design project	Handouts
Week 8 - 11/22	Recitation: Design project	Work collectively
Week 9 - 11/29	THANKSGIVING BREAK	No Class
Week 10 - 12/6	Return Design reports/Wrap-up	

Course Grades:

Grades will be based upon scores received on homework assignments, lab/recitation activities, preliminary WWTP design project, and examinations (and a research project for graduate students). Generally, the class is graded on a curve based on the final accumulated score for the course; however, scores of 90-100% are guaranteed a grade of “A”, 80 – 90% a “B”, and 70-80% a “C”. The weighting of activities will be as follows:

ENVE 421

		Percent of Grade
Homework, in-class assignments, labs	~6 homework assignments + in-class + lab/recitation	30
Midterm	Nov. 8 th : water quality, coagulation, softening, sedimentation, primary treatment	25
WWTP Report	Preliminary WWTP Design Report (due 11/27)	15
Final Exam	Dec. 12 th ; 2:00; Cumulative	30

ENVE 521

		Percent of Grade
Homework, in-class assignments, labs	~6 homework assignments + in-class + lab/recitation	15
Midterm	Nov. 8 th : water quality, coagulation, softening, sedimentation, primary treatment	25
WWTP Report	Preliminary WWTP Design Report (due 11/27)	15
Research Project	Oral and written report Due Dec. 2 nd or 4 th	15
Final Exam	Dec. 12 th ; 2:00; Cumulative	30

Graduate Student Research Projects (ENVE 521)

Graduate research projects will be conducted in groups of 2-3 students each. Each group will be responsible for researching a particular aspect of wastewater or drinking water treatment and producing a written and oral report in the form of a classroom “primer”; essentially a note set and 30 minute lecture on the subject that will be presented in the tenth week of class. Additional details will be provided during recitation Friday at noon.

Homework:

Homework is instrumental in helping students grasp fundamental concepts and to gain exposure to techniques and skills for applying these principles to real-life situations. Homework should be done in several sittings; you cannot expect to be successful doing homework quickly the night before it is due. Solutions must be written up independently.

Use the following guidelines for homework preparation:

- Use clean, 8.5 x 11 inch paper. Engineering paper is preferred; neatness is important and appreciated.
- Write on only one side of the paper and start a new problem on a new sheet of paper (or draw a horizontal line completely across the page between the end of the previous problem and the beginning of the new problem).
- Write the following at the top of each page:
Your Name
Course # (ENVE 421)
Due date, Problem Set No.
Page number/Total pages (top right corner)
- Securely staple all pages; do not fold or paper clip together.
- Show all of your work. **Draw a box around your final answer(s).**
- For graphical solutions, use graph paper or computer generated plots. Label the axes of your graph and include units.
- Provide computer program listings, if used, on a separate sheet.

Homework should be turned in before the beginning of the class. Late homework will not be accepted unless prior arrangements have been made.

Exams:

A midterm exam and a final exam, each worth 25% of the total grade, will be conducted on:

Midterm Friday, November 8th; Kearney 305 12:00-1:50pm

Final Exam Wednesday, December 12th; STAG 203 2:00pm

If you **MUST** miss an exam for an emergency situation, please let me know in advance of the exam. If you oversleep or skip an exam you will not have an opportunity to make it up. If you have a valid (according to me) time conflict and you let me know in advance, there is the possibility of taking an exam at an alternate time.

Class Attendance:

Attendance is important. You are expected to attend every class and participate in discussions. If you are not able to make class, please notify the instructor when possible. If you do miss class, it is your responsibility to find out what was covered and to obtain any administrative information that was presented.

Disruptive Behavior

While the University is a place where the free exchange of ideas and concepts allows for debate and disagreement, all classroom behavior and discourse should reflect the values of respect and civility. Behaviors which are disruptive to the learning environment will not be tolerated. As your instructors, we are dedicated to establishing a learning environment that promotes diversity of race, culture, gender, sexual orientation, and physical disability. Anyone noticing discriminatory behavior in this class, or feeling discriminated against should bring it to the attention of the instructors or other University personnel as appropriate.

Cheating and Student Conduct:

The instructor of this class take the issue of academic honesty very seriously. Any instance in which a student is caught cheating will be handled in strict accordance with the policies outlined at <http://www.orst.edu/admin/stucon/achon.htm>. In order to provide students with a positive learning environment, OSU has adopted a pledge of civility, which can be found at <http://osu.orst.edu/admin/stucon/index.htm>. If evidence of academic dishonesty comes to the instructor's attention, the instructor will document the incident, permit the accused student to provide an explanation, advise the student of possible penalties, and take action. The instructor may impose any academic penalty up to and including an "F" grade in the course after consulting with school head and informing the student of the action taken.

Disability:

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

Veterans

Veterans and active duty military personnel with special circumstances are welcome and encouraged to communicate these, in advance if possible, to the Instructor.