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ENCE 5323

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ENCE 4323/5323
DESIGN OF WATER AND WASTEWATER TREATMENT SYSTEMS
Required

CATALOG DESCRIPTION

ENCE 4323/5323 Design Of Water And Wastewater Treatment Systems **3 cr.**

Design and analysis of unit operations and processes for water and wastewater treatment processes. Topics include physical, chemical, and biological unit processes. Course will focus on water and wastewater treatment plant design including comparisons of alternate treatment processes. Graduate students enrolled in 5323 must carry out additional work to earn graduate credit.

PREREQUISITES

ENCE 3323 or ENCE 3326/3327 Introduction to Environmental Engineering.

TEXTBOOKS AND OTHER MATERIAL

1. *Water and Wastewater Engineering, Design Principles and Practice*, by Mackenzie L. Davis, McGraw Hill, 2010 (Required).
2. *Introduction to Environmental Engineering*, by M. L. Davis and D. Cornwell (Recommended). This is the ENCE 3326/3327) textbook.
3. *Water Works Engineering, Planning, Design, Operation*, by Syed R. Qasim, Edward M. Motley, and Guang Zhu, Prentice Hall, 2000 (Strongly recommended).

STUDENT LEARNING OBJECTIVES

Students who satisfactorily complete this course will be able to:

1. Apply chemical reaction engineering principles to select the most appropriate reactor type for water and wastewater treatment depending on the respective reaction kinetics.
2. Explain the physical, chemical and biological processes taking place in water and wastewater treatment plants.
3. Solve problems related to unit performance in conventional water and wastewater treatment plants.
4. Prepare a preliminary design of conventional water and wastewater treatment plants, and organize the results in a project report.
5. Work as team members and follow a prescribed work plan.

COURSE TOPICS

(Actual dates will be updated as the course develops)

Tentative Dates	TOPICS	Readings from Davis (D) and Qasim (Q)	Assignment and Project Tasks Due Dates
8/20, 25, 27	Reactions and reactors in environmental engineering	Handouts	Task 1, Process layout, 9/3
9/1	Surface Water Treatment. The SWT Rule. Conventional rapid sand filtration plants	D Sections 2-3 through 2-6, Q pp 2-18; handouts	HW #1, 9/8.
9/3	Coagulation. Rapid mixing units	D Sections 3-1 to 3-4; Q Ch. 5; 229-238, 246-253	Task 2, Coagulation, 9/17
9/8, 10	Flocculation units	D. Sections 3-5 to 3-9; Q 253-297	
9/15, 17, 22, 24	Sedimentation. Design of settling tanks for water treatment facilities	D Ch. 7; Q 301-352	HW #2, 10/8.
9/29	Rapid sand filtration		
10/1	First exam (through sedimentation)		
10/6, 8, 13	Rapid sand filtration. Filter media. Filter operation. Head loss during filtration.	D Ch. 8; Q 355-419	Task 3, Flocculation, 10/1
10/15	Mid-semester break		
10/20, 22	Design of rapid sand filters. Filter backwashing.	D Ch. 8; Q 355-419	HW #3, 10/29.
10/27	Disinfection	D Sections 10-1 through 10-3; Q 468-508	Task 4: Settling 10/22
10/29, 11/3	Preliminary wastewater treatment. Bar racks. Grit removal. Primary treatment	D Sections 13-4 through 13-6	
11/5, 10	Biological treatment. Activated sludge: Theory of activated sludge operation. Design criteria. Operation, types of activated sludge process.	D Sections 16-1, 16-2, 16-6, 16-7	Tasks 5, 6, 7: Filtration, disinfection, hydraulic gradient, 11/12
11/12, 17	Trickling filters: Theory of operation, design criteria for low and high rate filters, modifications of the basic process, two-stage filters.	D Sections 17-1 to 17-4	HW #4, 11/24.
11/19	Second exam (through trickling filters)		
11/24, 12/1, 3	Sludge stabilization: anaerobic digestion, aerobic digestion. Sludge dewatering and disposal.	D Sections 20-1, 20-2, 20-3, 20-8, 20-9	Final Report, 12/3
12/10, 10AM-12	Final exam (comprehensive)		

CLASS SCHEDULE

Class Meetings: TTh 9:30 AM – 10:45 AM, EN 318

INSTRUCTOR CONTACT INFO AND OFFICE HOURS

Enrique J. La Motta, Ph.D., P.E.

Office hours: TTh 2:00 – 4:30 pm, EN 815

E-mail address: elamotta@uno.edu

Phone: 280-6093

CRITERIA FOR GRADING, GRADING STANDARDS

There will be three exams (two mid-term tests and the final exam, each with the same weight), worth 70 percent of the grade, four home-works, worth 10 percent, and a project, worth 20 percent of the grade. The project will be prepared by groups of three students, and will be developed through the semester.

The final letter grade is computed as follows: The overall numerical grade will be divided by the highest score in class, so that the best possible normalized score will be 100 points. If the normalized score is more than 90 points the grade will be an A; from 80 - 89, the grade will be a B; from 70 – 79, the grade will be a C; from 60 - 69, D; below 60, F.

TENTATIVE DUE DATES FOR PROJECT, EXAMS

ASSIGNMENT/EXAM	TOPIC	DUE DATE
Task 1	General plant layout	9/3
Task 2	Coagulation	9/17
Task 3	Flocculation	10/1
Task 4	Settling	10/22
Tasks 5, 6 & 7	Filtration, disinfection, HG	11/12
Project	Final report	12/3
Home work 1	Reactors	9/8
Home work 2	Settling	10/8
Home work 3	Filtration	10/29
Home work 4	Wastewater treatment	11/24
First test	Through sedimentation	10/1
Second test	Through trickling filters	11/19
Final exam	Comprehensive	12/10

ATTENDANCE POLICY

Attendance is required. If you cannot attend class for some reason, call the instructor or the Engineering administrative assistant and explain why.

ACADEMIC DISHONESTY POLICY

Students are expected to conduct themselves according to the principles of academic integrity as defined in the statement on Academic Dishonesty in the UNO Student Code of Conduct. Any student or group found to have committed an act of academic dishonesty shall have their case turned over to the Office of Student Accountability and Advocacy for disciplinary action, which may result in penalties as severe as indefinite suspension from the University. Academic dishonesty includes, but is not limited to: cheating, plagiarism, tampering with academic records and examinations, falsifying identity, fabrication, or misrepresentation, and being an accessory to an act of academic dishonesty. **Not actively participating in the activities of your project group falls in the category of *fabrication or misrepresentation*, and therefore, it will be considered *academic dishonesty*.**

The new policy on Academic Dishonesty is available online at:

http://www.studentaffairs.uno.edu/studentpolicies/policymanual/academic_dishonesty.cfm

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students who seek accommodations for disabilities must contact the Office of Disability Services prior to discussing their individual needs for accommodation with their instructors.

EXTRA WORK FOR RECEIVING GRADUATE CREDIT IN 5000-LEVEL CLASSES

Students enrolled in ENCE 5323 will be responsible for the material contained in Chapters 12 (Membrane Filtration) and 26 (Tertiary Treatment) of the textbook. Special assignments, and questions and problems dealing with these two chapters will be given in the final exam.



Important Dates*

Last day to adjust schedule w/out fee	08/18/2015
Semester Classes Begin	08/19/2015
Last day to adjust schedule w/fee, or withdraw with 100% refund	08/25/2015
Last day to apply for December commencement	09/25/2015
Final day to drop a course or resign	10/14/2015
Mid-semester examinations	10/05-10/09/2015
Final examinations	12/07-12/11/2015
Commencement	12/18/2015

*Note: check Registrar's website for Saturday and A/B sessions, and for items not listed here: <http://www.registrar.uno.edu>

Fall Semester Holidays

Labor Day	09/07/2015
Mid-semester break	10/15-10/16/2015
Thanksgiving	11/26-11/27/2015

Withdrawal Policy – Undergraduate only

Students are responsible for initiating action to resign from the University (withdraw from all courses) or from a course on or before dates indicated in the current Important dates calendar. Students who fail to resign by the published final date for such action will be retained on the class rolls even though they may be absent for the remainder of the semester and be graded as if they were in attendance. Failure to attend classes does not constitute a resignation. Check the dates on the Registrar's website, <http://www.registrar.uno.edu>. Please consult The Bulletin for charges associated with dropping and adding courses.

Incomplete Policy – Undergraduate only

The grade of I means *incomplete* and is given for work of passing quality but which, because of circumstances beyond the student's control, is not complete. The issuance of the grade of I is at the discretion of the faculty member teaching the course. For all graduate and undergraduate students, a grade of I becomes a grade of F if it is not converted before the deadline for adding courses for credit (as printed in the Important Dates Calendar) of the next regular semester including summer semester.

Repeat Policy

When a student is permitted to repeat a course for credit, the last grade earned shall be the one which determines course acceptability for degree credit. A student who has earned a C or better in a course may not repeat that course unless, (1) the catalog description indicates that the course may be repeated for credit, or (2) the student's Dean gives prior approval for documented extenuating circumstances.

Graduate Policies

Graduate policies often vary from undergraduate policies. To view the applicable policies for graduate students, see the Graduate Student Handbook: <http://www.uno.edu/grad/documents/GraduateStudentHandbookk2014.pdf>

Academic Dishonesty Policy

<http://www.uno.edu/student-affairs-enrollment-management/documents/academic-dishonesty-policy-rev2014.pdf>

Safety Awareness Facts and Education

Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here: <http://www.uno.edu/student-affairs-enrollment-management/>

UNO Counseling Services and UNO Cares

UNO offers care and support for students in any type of distress. Counseling Services assist students in addressing mental health concerns through assessment, short-term counseling, and career testing and counseling. Find out more at <http://www.uno.edu/counseling-services/>. First-year students often have unique concerns, and UNO Cares is designed to address those students succeed. Contact UNO Cares through <http://www.uno.edu/fye/uno-cares.aspx>.

Emergency Procedures

Sign up for emergency notifications via text and/or email at E2Campus Notification: <http://www.uno.edu/ehso/emergency-communications/index.aspx>. All emergency and safety procedures are explained at the Emergency Health and Safety Office: <http://www.uno.edu/ehso/>.

Diversity at UNO

As the most diverse public university in the state, UNO maintains a Diversity Affairs division to support the university's efforts towards creating an environment of healthy respect, tolerance, and appreciation for the people from all walks of life, and the expression of intellectual point of view and personal lifestyle. The Office of Diversity Affairs promotes these values through a wide range of programming and activities. <http://diversity.uno.edu/index.cfm>

Learning and Support Services

Help is within reach in the form of learning support services, including tutoring in writing and math and other supplemental instruction. Visit the Learning Resource Center in LA 334, or learn more at <http://www.uno.edu/lrc/>.

Affirmative Action and Equal Opportunity

UNO is an equal opportunity employer. The Human Resource Management department has more information on UNO's compliance with federal and state regulations regarding EEOC in its Policies and Resources website: <http://www.uno.edu/human-resource-management/policies.aspx>