

Wastewater Treatment System Design

CHEE / CE 476B (3 units)

Spring 2018



Instructor:

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The University of Arizona
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Objectives:

This course focuses on the application of theory and engineering experience to the design of unit operations for the treatment of wastewater. Covers wastewater regulations, conventional treatment technologies and selected advanced treatment topics.

Prerequisites:

None. Following ChEE/CE 370R prior to attending this course is advisable for undergraduates.

Graduate-level requirements:

Graduate-level requirements include additional homework problems, a course paper, and additional exam questions.

Text books: Metcalf & Eddy, *Wastewater Engineering: Treatment and Resource Recovery*, 5th Ed, McGraw-Hill, 2010. ISBN-13: 978-0073401188

Lecture time: Tuesday and Thursday from 9.30 -10.45 AM, Mines & Metallurgy, Rm 213

Web site: D2L

Field trips: Two different wastewater treatment plants

Grader: Alvaro Simon-Pascual (Email: asimonpascual@email.arizona.edu)

Homework: There will a number of homework assignments during the semester, and a due date is provided with each. Homework is due on the due date at the BEGINNING of class. Penalties for homework handed in late are:

- One day or less: 30% off
- 2 to 3 days: 50% off.
- More than 3 days: no credit.

Grading:

400-level	
Midterm exams	25%, 25%
Final exam	30%
Homework	20%

Exam Guidelines and Policy

Exam Resources: A **single** 8.5 inch by 11.0 inch sheet of paper may be brought to each exam with any equations, information, worked problems, etc. the student feels useful. The paper may be typed or handwritten, and both sides may be used. One or more sheets of conversion factors, constants, numerical values, etc. will be handed out with the test. These will **NOT** include equations.

Late Exams: No make-up exams will be given except by prior arrangement with the instructor, at least, one week before the scheduled exam time.

IMPORTANT DATES AND DEADLINES

DATE	Exam or Date due
Febr. 15 (Th)	Deadline to choose topic for assignment (only 500-level)
Febr. 27 (Tu)	QUIZ 1
April 3 (Tu)	QUIZ 2
May 8 (Tu)	Final examination (Lecture 1 to end): 8.00-10.00 AM

COURSE CONTENTS

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- Introduction

 - Wastewater generation

 - Wastewater characteristics – Physical and chemical characteristics

 - Wastewater characteristics- Biological characteristics

 - Environmental legislation / permitting

 - Wastewater microbiology

 - Pharmaceuticals and other organics in wastewater

 - Kinetics

 - Reactors

 - Wastewater equalization

 - Primary treatment of wastewater

 - Aeration and mass transfer

 - Activated sludge processes I

 - Activated sludge processes II

 - *Visit to wastewater treatment plant*

 - Aerobic biofilm processes

 - Lagoons

 - Nitrification and denitrification I

 - Nitrification and denitrification II

 - *Visit to wastewater treatment plant*

 - Phosphorous removal processes

 - Advanced processes for wastewater treatment and resource recovery

 - Anaerobic wastewater treatment processes

 - Sludge handling and disposal

 - Industrial wastewater treatment
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Additional Policies, Warranties and Disclaimers:

- 1) Students are expected to attend lectures.
- 2) All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion; Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored. Also absences due to medical or family emergencies will also be excused.
- 3) Treat speakers with respect and in a professional manner. **Do not arrive late to class** and give the speakers your attention (e.g. no texting, emailing, etc.)
- 4) Cell phones, pagers, and other electronic devices must be turned off before the start of class. If using such devices to take notes, please put switch to airplane mode.
- 5) Integrity is expected of every student in all academic work. Scholastic dishonesty will not be tolerated. Please refer to the [UA Code of Academic Integrity](#) for information about procedures and about what constitutes scholastic dishonesty.
- 6) There is no tolerance for threatening behavior by students: See: [Threatening Behavior by Students](#) and [Disruptive Behavior in an Instructional Setting](#).
- 7) **Accommodations for students with disabilities:** It is the University's goal that learning experiences be as accessible as possible. Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, <http://drc.arizona.edu/>. You must register and request that the Center or DRC send me official notification of your accommodations needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. *The need for accommodations must be documented by the appropriate office.* Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.
- 8) **Special materials required for the class:** none
- 9) **Confidentiality of Student Records** <http://www.registrar.arizona.edu/ferpa/default.htm>
- 10) **Final Exam Regulations:** <http://www.registrar.arizona.edu/schedule101/exams/examrules.htm>.
- 11) **Subject to Change Statement:** The information contained in the syllabus (except grade and absence policies) may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.