CE 5317: Environmental Engineering Process and Analysis Lab

Fall 2018

1. Course Number and Name: CE 5317 Environmental Engineering Process and Analysis Lab
Section: 001 (82810)-Lecture on Monday and Wednesday
Section: 101 (88296)-Lab on Friday

2. Credits and Contact Hours: 3 Credits; 2 Hour Lecture and 3 Hour Lab
Class time: 14:00-14:50 on Mon/Wed for lecture and 09:00-11:50 on Fri for lab
Classroom: Woolf Hall (WH) 221 for Lecture and Nedderman Hall (NH) B09 for Lab

3. Instructor's Name: Prof. Hyeok Choi, Ph.D.
Office number: Nedderman Hall (NH) 437
Office telephone: 817-272-5116
E-mail: hchoi@uta.edu
Faculty profile: http://www.uta.edu/profiles/Hyeok-Choi
Office hours: Mon/Wed 15:00-17:00 or by Appointment

4. Text Book: No text book is required.
Supplemental Materials: All lab handouts/materials will be available at MavSpace at https://mavspace.uta.edu/xythoswfs/webui/_xy-4103860_1-t_SKAO8aSg.
References
(1) Chemistry for Environmental Engineering and Science by Clair N. Sawyer, Perry L. McCarty, and Gene F. Parkin, 2003 (will be placed on reserve in the Science and Engineering Library).
(2) AEESP Environmental Engineering Processes Laboratory Manual, 2001.

5. Specific Course Information
Description of Course Content: The course meets for 2 hours of lecture and 3 hours of lab each week. Lectures will cover advanced analytical procedures for the analyses of air, liquid, and other wastes, including optical, chromatographic, electrical, and other instrumental methods of analysis. Lectures will also review the basics of physical/chemical processes. In the laboratory, students will demonstrate and analyze basic reactor types (continuously-stirred tank reactor, plug flow reactor, and reactors in series) and kinetics, as well as environmental engineering processes (physical/chemical) for treatment of contaminants, including activated carbon adsorption, advanced oxidation processes, and membrane separation.
Pre-requisites: None.
Required or Elective Course: Elective.

6. Specific Goals for the Course
Course Learning Outcomes: As a result of this course, students will be able to
a. Apply knowledge of engineering principles to understand various chemical reactors and environmental processes (herein, treatment systems).

b. Design and conduct important laboratory experiments widely used in the environmental engineering field to determine the characteristic behavior of the treatment systems.
c. Analyze and interpret data from the laboratory experiments for the design and operation of the treatment systems.
d. Use the experimental techniques/skills necessary for environmental analysis practices and learn about sophisticated modern environmental/analytical instrumentation.
e. Work and cross-train in groups to cooperatively conduct the laboratory experiments, to share the experimental data, and to prepare professional reports for common sections.
f. Communicate effectively by producing high quality written technical reports.

Student Outcomes from ABET EAC Criteria (Not Applicable)

7. Brief List of Lab Topics to be Covered

- Unit Operations and Processes
- Advanced Oxidation
- Membrane Separation
- Activated Carbon Adsorption
- Reaction Kinetics
- Reactor Type and Design
- Plug Flow Reactor (PFR)
- Continuously Stirred Tank Reactor (CSTR)
- Reactors in Series
- Analytical/Environmental Instrumentation
- Optical, Electrical, and Chromatographic Analysis
- High Performance Liquid Chromatography (HPLC) / Gas Chromatography (GC)
- Total Organic Carbon Analyzer (TOC)
- UV-Visible Spectrophotometers

OTHER USEFUL INFORMATION

Modern Teaching Tools and Assistances: Power point presentation, on-board writing, course summary and handout, video clip, lab visit, etc.

Requirements: A few of laboratory experiments may require students to return to the lab outside of normal class hours to take readings.

Descriptions of Major Assignments and Examinations:

Assignment/Exam	Weighting %
Lab Reports 1-3 (12 pts each)*	36
Midterm exam (Week 9: Oct. 19 Friday 14:00-14:50)	24
Lab Reports 4-6 (8 pts each)*	24
Final exam (Week 15: Nov. 30 Friday, 14:00-14:50)	16

*A grading rubric will be used to grade reports as follows: 100 for perfect, 95 for excellent, 90 for very good, 85 for good, 80 for fair, 75 for poor, and 70 for very poor (note attached rubric).

Lab Reports to Submit and Due Dates: Each report should be submitted within 1 week right after the corresponding experiment is completed. Otherwise, 10% penalty will be applied for delay in each week.

Course Update: Prior to each class, all the course materials including lab handouts and brief PPT presentations will be posted in the Blackboard. Students will need NetID and corresponding password. Students need to check the Blackboard regularly before coming to class. Students also need to print out them and bring the materials to the class. No hard copies for the course materials will be given to students. I will try to send an email to students with updated course information. However, it is students' responsibility to visit the Blackboard regularly.

Office Hours: In addition to my posted office hours I am also available to meet with students most times when I am in my office and the door is open. However, the surest way to meet with me is to make an appointment by phone. I will normally be in my office during office hours, but if I do not have an appointment scheduled, I will not hesitate to leave my office during office hours to attend an important meeting.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments (i.e., lab reports), preparing for quiz and exams, etc.

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or

her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will take attendance sporadically and take a step to increase attendance rates if needed in cases of chronic low attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

Grading: Grades will be determined according to the following scale. The instructor reserves the right to vary the grade scale listed below.

90 – 100 %	A
80 - 89.9 %	B
70 - 79.9 %	C
60 - 69.9 %	D
Below 60 %	F

Make-up Exams: No make-up exams are given except for medical or other similar hardships where advanced arrangements are made with the instructor; or in case of non-selective medical emergencies with appropriate physician's note or documentation. Other than circumstances described above, failure to take the exam at the scheduled time will constitute a grade of zero in the exam.

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.
Undergraduate courses: http://catalog.uta.edu/academicregulations/grades/ - undergraduatetext
Graduate courses: http://catalog.uta.edu/academicregulations/grades/#graduatetext
Student complaints: http://www.uta.edu/deanofstudents/complaints/index.php

Professional Code of Conduct: Students are expected to act in a manner consistent with a professional civil engineer. You are responsible for learning the material that makes up this course. I am responsible for helping you to learn it and determining if you have done so. Most people must do the assigned homework to learn the material of this course. My tests are designed to determine how much you have learned. To me, "learning" means understanding the material well-enough that 1) you can explain it to others so they can understand it and 2) solve problems you have not seen before. I welcome all pertinent questions in class and I am willing to spend many hours outside of class to help you learn. I also welcome any suggestions you have on how I can better help you to learn and/or determine if you have learned the material of this course. You are expected to attend every class and to show up on time.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to

drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** http://www.uta.edu/disability/ or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/. Faculty are encouraged to discuss plagiarism and share the following library tutorials http://libguides.uta.edu/copyright/plagiarism and http://library.uta.edu/plagiarism/

Lab Safety Training: Students registered for any lab courses must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

How to take Lab Safety Training Course

(1) Login to **Blackboard** at https://elearn.uta.edu with your NetID and password.
(2) Under **My Blackboard** tab, click **Lab Safety Training.**
(3) Click **Welcome** from the left pane to start and follow the instructions.

Electronic Communication: Communication between students, teaching assistant(s), and instructor will be maintained via e-mail. UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/.

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week: for semester-long courses**,** a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located at right side connected to upper stairways (will be demonstrated during the first 2 classes. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. We will discuss in detail.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/studentsuccess/success-programs/programs/resource-hotline.php

The IDEAS Center (2nd Floor of Central Library) offers **FREE** tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

The English Writing Center (411LIBR): The Writing Center offers **FREE** tutoring in 15-, 30-, 45-, and 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at https://uta.mywconline.com. Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information on all our programs and services. The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. http://library.uta.edu/academic-plaza

Librarian to Contact: http://www.uta.edu/library/help/subject-librarians.php. Please also note the followings for additional information about library links.

Civil Engineering Librarian: Martin Wallace, Engineering Librarian. Mailing address: Central Library, Office Number: 518. Phone: 817-272-3924, Email: martin.wallace@uta.edu

LIBRARY library.uta.edu
RESOURCES FOR STUDENTS

Research or General Library Help
Academic Plaza Consultation Services library.uta.edu/academic-plaza
Ask Us ask.uta.edu
Library Tutorials library.uta.edu/how-to
Subject and Course Research Guides libguides.uta.edu
Librarians by Subject library.uta.edu/subject-librarians
Research Coaches http://libguides.uta.edu/researchcoach

Resources
A to Z List of Library Databases libguides.uta.edu/az.php
Course Reserves pulse.uta.edu/vwebv/enterCourseReserve.do
Study Room Reservations openroom.uta.edu

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Tentative Laboratory Schedule and Assignments*

1st half of the semester (8/22-10/12 and midterm exam; 60% contribution to final grade)

Week	Date	Lecture			Lab			Report
		Unit Process Topic	**Analysis Topic**	**Ref****	**Title**	**Analysis Method**	**Ref****	
1	8/22-8/24	8/22 Wed (No class) Lab preparation TA assignment			8/24 Fri (No lab) Lab preparation TA assignment			
2	8/27-8/31	8/27 Mon 8/29 Wed Course introduction & safety training			8/31 Fri (Choi) Lab visiting and on-site safety training			
3	9/3-9/7	9/3 Mon (Holiday) 9/5 Wed Advanced Oxidation Processes		A	9/7 Fri (TA: XXX)*** Chemical Decomposition of Organic Contaminants Using Fenton Reaction		A	Combined Report 1 (TA: XXX)
4	9/10-9/14		9/10 Mon 9/12 Wed Liquid Chromatography	A		9/14 Fri (TA: XXX) Chromatographic Analysis of Organic Contaminants (Sulfamethoxazole)	A	
5	9/17-9/21	9/17 Mon 9/19 Wed Membrane Separation		A	9/21 Fri (TA: XXX) Physical Separation of Biological Suspension Using Membrane		A	Combined Report 2 (TA: XXX)
6	9/24-9/28		9/24 Mon 9/26 Wed TOC Analyzer	A		9/28 Fri (TA: XXX) Measurement of Total Organic Carbon	A	
7	10/1-10/5	10/1 Mon 10/3 Wed Activated Carbon Adsorption		A	10/5 Fri (TA: XXX) Physical Removal of Organic Dyes Using Activated Carbon		A	Combined Report 3 (TA: XXX)
8	10/8-10/12		10/8 Mon 10/10 Wed UV-Vis Spectrophotometer	A		10/12 Fri (TA: XXX) Optical Determination of Organic Dyes (Methylene Blue)	A	
9	10/15-10/19	10/15 Mon 10/17 Wed Summary & Exam Preparation			**10/19 Fri** **Midterm Exam**			

2st half of the semester (10/15-12/4 and final exam; 40% contribution to final grade)

Week	Date	Lecture			Lab			Report
		Unit Process Topic	**Analysis Topic**	**Ref****	**Title**	**Analysis Method**	**Ref****	
10	10/22-10/26	10/22 Mon Kinetics	10/24 Wed Titration	B 3.10	10/26 Fri (TA: XXX) Kinetics of the Perdisulfate-Iodide System	NA	A	Submit only 3 reports in the second half ***.
11	10/29-11/2	10/29 Mon CSTR Reactors	10/31 Wed Electrical Methods of Analysis (Potentiometric Analysis: Electrodes)	B 12.3	11/2 Fri (TA: XXX) Laboratory Study of Completely Mixed Flow Reactors Using Ion Specific Electrodes	11/2 Fri (TA: XXX) Ion Specific Electrodes	C 1.2.1	
12	11/5-11/9	11/5 Mon 11/7 Wed Plug Flow Reactors		B 12.3	11/9 Fri (TA: XXX) Laboratory Study of Plug Flow Reactors	11/9 Fri (TA: XXX) Ion Specific Electrodes	C 1.2.2	
13	11/12-11/16	11/12 Mon 11/14 Wed Non-Ideal Reactors		B 12.3	11/16 Fri (TA: XXX) Reactors in Series	11/16 Fri (TA: XXX) Ion Specific Electrodes	C 1.2.3	
14	11/19-11/23	11/19 Mon & 11/21 Wed (No class) (Thanksgiving Week)			11/23 (Holiday)			
15	11/26-11/30	11/26 Mon 11/28 Wed Summary Exam Preparation			**11/30 Fri** **Final Exam**			

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.
**A: Handouts will be distributed through MavSpace; B: Sawyer, McCarty, and Parkin; and C: AEESP Environmental Engineering Processes Laboratory Manual.
***Lab Instructors (TAs) will be announced soon.
**** You are required to prepare only three reports (Reports 4, 5, and 6) out of the 4 labs. It is always good to select the labs which occur first so that you can focus on exam preparation when the semester approaches the end.