

**CE 3334: Principles of Environmental Engineering**  
Summer 2016

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**Office Hours** : Mon and Wed 10:00 am to 1:00 pm;  
Other than office hours you can meet me by making an appointment.  
**Section Information** : CE 3334-001/002  
**Time and Place of Class Meetings**: MW 8:00 am – 9:50 am, NH 109

**Description of Course Content:** Physical, chemical, and biological unit operations and processes in an air, water, and land environment. Prerequisites: Grade of C or better in CHEM 1465 or 1442; Grade of C or better in CE 3305; concurrent enrollment in CE 3131.

**Student Learning Outcomes:** The course material will include lectures on the use of fundamental mathematics, engineering and chemistry principles to solve environmental engineering problems related to water, wastewater, air quality and solid waste; design components of systems/processes for treating water and wastewater; and to demonstrate an understanding of key pieces of environmental legislation. The student abilities and outcomes from this course are

- Ability to apply knowledge of mathematics, science, and engineering
- Ability to analyze and interpret data
- Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

**Required Textbooks and Other Course Materials:** Principles of Environmental Engineering and Science, 3rd edition, Mackenzie Davis & Susan Masten, McGraw-Hill, 2013, ISBN 978-0-07-339790-0.

**Descriptions of major assignments and examinations:**

**Homework:** Homework will be assigned every week and it is due one week after it is assigned (usually on Friday). Late homework will not be accepted without the consent of the instructor. Homework must be done using the typical engineering format of Given, Find, and Solution. Your solutions must be presented linearly down the page so a reviewer can easily follow your solution. Every reasonable step in your solution must be presented.

**Exams:** There will be two midterm exams and one final exam. Students who miss the exam without a written medical excuse or an excuse approved by the instructor will receive a grade of zero for the exam. Students presenting proper documentation of an excused absence will have to schedule the makeup test within 3 days of the return. No makeup exam for the final.

**Quizzes or Term paper:** You can choose either quizzes or term paper. If you opt for term paper then please see the guidelines for term paper in the blackboard. Regarding quizzes, announced quizzes will be given throughout the semester. All quizzes will have equal weightage. No make-up opportunities for the missed quizzes. Students presenting proper documentation of an excused absence will have the missed quizzes excluded from their grade.

**Attendance:** Class attendance is required. In the event of an absence, it is the student's responsibility to obtain class notes, assignments, etc.

**Grading:** I reserve the right to vary from the grade schedule listed below.

Homework	10%
Quizzes or Term paper	15%
Exam 1	25%
Exam 2	25 %
Final Exam	25%
Plant visit (Extra)	2% each

<b>Grade Basis:</b>	90 – 100 %	A
	80 - 89.9 %	B
	70 - 79.9 %	C
	60 - 69.9 %	D
	Below 60 %	F

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.

**Make-up Exam Policy:** 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 Grievance Policy:** Grade grievances will be handled according to the policy described in the College of Engineering portion of the Catalog.

**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://www.uta.edu/ao/fao/>).

**Americans with Disabilities Act:** The University of Texas at 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)*. 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 that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Title IX:** The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX).

**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 as they see fit in their courses, including (but not limited to) 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.

**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](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

**Electronic Communication:** 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>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be 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 enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** 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 in the stairwell near the elevators. 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 handicapped individuals.

**Librarian to Contact:** Sylvia George-Williams, Engineering Librarian, NH - B03D, Tel: 2-7519, Email: [sylvia@uta.edu](mailto:sylvia@uta.edu)

## Course Schedule

Date	Topics covered / Notes	Resource
June 6, 8	<b>Course Policies; Introduction-</b> Environmental regulations, Roles of Environmental engineers and environmental scientist. Ecology. <b>Environmental quality parameters and chemistry:</b> Concentrations, Solids, Turbidity, Nitrogen, Phosphorus,	Ch 1.1-1.8 Ch 5.1-5.4 Class Notes
June 13, 15	<b>Organic chemistry</b> – Lipids, Nucleotides and Nucleic acid, protein carbohydrates. Microbes and Metabolic processes - Classification of microorganisms, Metabolism, Ideal gas law, Henry’s Law. Equilibrium constant expressions, ionization constants, Types of reaction, Oxidation- Reduction reactions.	Handouts
June 20, 22	Acid- base Equilibrium, Carbonate buffer system – closed system, Alkalinity, Acidity, Concentrations of chemical species in precipitation-dissolution reactions, Hardness, Scaling and corrosion, Reaction kinetics –rate and order of reaction.	Handouts
June 27, 29	<b>Materials and energy balances:</b> Material balance diagrams, Reactors. Mass balance problems with and without transformation, Steady state, Conservative, Non-conservative. Step function response, Reactor alternatives based on volume, efficiency and retention/residence time. <b>Exam 1 on June 29.</b>	Chapter 4 Handouts
July 4, 6	DO, BOD – seeded and unseeded, rate constant, Difference between COD, ThOD, BOD, NOD, NBOD. Oxygen sag curve. Coliforms.	Ch 9.3
July 11,13	<b>Water treatment:</b> Primary and secondary treatments - rapid mix and flocculation tanks, coagulation – consumption of alkalinity for a given dose of alum. Sediment basin – size and weir length, Filtration, disinfection- different types of disinfectant.	10-2,4,5,6
July 18, 20	<b>Wastewater treatment:</b> Process and principles - Pretreatment, primary treatment, secondary treatment, tertiary treatment and Disinfection. Efficiency of TSS and BOD removal. Evaluate or size primary (and secondary) sedimentation tanks with respect to detention time, overflow rate, solids loading and weir loading.	Ch 11.1-11.8
July 25, 27	Activated sludge treatment - qc and F/M ratio, Hydraulic detention time, soluble BOD <sub>5</sub> , wasting flow rate. <b>Exam 2 on July 27. July 27 - Deadline for finalizing the term paper topic.</b>	
Aug 1, 3	<b>Air pollution:</b> Threshold pollutants, non-threshold pollutants, Emission standards and air quality standards. Criteria pollutants - Causes, sources and effects, Terms associated with air quality and air quality standards. Air quality problems. Atmospheric dispersion, Air pollution control.	Ch 12
Aug 8, 10	<b>Solid Waste and Hazardous Materials Legislation:</b> Solid waste, Hazardous waste, Classification of wastes, terminology associated with solid and hazardous material legislation. <b>Review. Aug 10 – Deadline for term paper/plant visit report submissions</b>	Ch 13
Aug 15	<b>Final exam</b> 8:00 am - 10:00 am	

*“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. –Srinivas Prabakar.”*