**CE 4355** **Design of** **Water and Wastewater Treatment Facilities**

**Fall 2016**

**Instructor:** Andrew P. Kruzic

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**Office Hours:** M,Tu 2:00 – 4:00 pm, Th 1:00 – 4:00 pm or by appointment

**Section Information:** CE 5326-001/002

**Time and Place of Class Meetings:** General Academic Classroom Building 103

**Description of Course Content:** Design of facilities commonly used in water and wastewater treatment plants including pumps, pipelines, channels, flow measurement and control devices, sludge pumping, aeration equipment, and chemical feed and storage. Materials of construction, process control interface, and operation and maintenance factors are also discussed. Credit not granted for both CE 4355 and 5326. Prerequisites: CE 3142 and CE 3334

**Student Learning Outcomes:** To provide students with design considerations and design procedures for water and wastewater treatment facilities. The course material will include lectures on theory and design, homework problems, and design projects. Students will be required to use manufacturer's catalogs for equipment selection and design details. In addition this course will focus on the following student abilities and educational outcomes:

• Ability to apply fundamental knowledge in their specialized area of interest

• Ability to conduct independent and original study ranging from gathering of information to proposing, creating and documenting the study

• Ability to present demonstrate mastery of the subject matter, and contribute in the advancement of knowledge in the area of study

• Ability to present scientific results in both written and oral format to various forums

**Required Textbooks and Other Course Materials:** Metcalf & Eddy, Wastewater Engineering: Treatment, Disposal and Reuse, 4th Edition, McGraw-Hill Book Co., New York, 2003; 5th Edition is acceptable.

**Descriptions of Major Assignments and Examinations:** There will be weekly homework assignments, one in-class mid-term exam, one in-class final exam; one Design Project with two submittals, and one term paper. Homework is due one week after it is assigned (usually on a Thursday). 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. Two general presentation formats are acceptable: 1) on engineering paper using pencil and very neat hand printing, or 2) printed output from a computer word processing and/or spread sheet program. In both cases the solution is given on one side only. Spreadsheet solutions must also have hand generated sample calculations. Graphs must be large enough to be easily read (typically half a page) and the axes must be clearly defined and labeled including units. Computer generated graphs should give the equation of the fitted line. Hand generated graphs must be done on engineering paper with a straight edge. 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. Solutions in which the solve function of a calculator is used are not acceptable. Answers must contain at least 2 but no more than 4 significant digits and appropriate units. Your homework must be stapled in the upper left hand corner and your name and submitted date must be given on the first page.

**Attendance:** Test questions will be taken from reading material, information covered in the class and most importantly, homework assignments. In-class students are expected to participate in the classroom discussions. All in-class students are expected to attend each lecture. Roll will not be taken and class attendance will not be used in grade assignment. Distant learning students are expected to interact with the instructor via email and/or telephone. Completion of homework assignments will be used as a measure of class involvement.

**Techniques, Skills and Modern Engineering Tools Used in this Course:** Spreadsheet and/or MathCAD solutions to HW is encouraged but not required. See additional requirements for HW submittals with spreadsheet/MathCAD above. Your design project will require you to recognize and comply with the requirements of the Texas Administrative Code applicable to you design.

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

Homework 10 %

1st Test 30 %

Design Project 1st submittal 18 %

Design Project 2nd submittal 12 %

Final (2nd Test) 30 %

Optional Term Paper 5 %

85 - 100% A

65 - 84.9% B

55 - 64.9% C

45 - 54.9% D

 < 45% 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**: 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://wweb.uta.edu/aao/fao/>).

**Disability Accommodations:** UTArlington 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)** [www.uta.edu/disability](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](http://www.uta.edu/disability).

**Counseling and Psychological Services, (CAPS)** [www.uta.edu/caps/](http://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*](http://www.uta.edu/hr/eos/index.php)*.*

**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](http://www.uta.edu/titleIX) or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or [jmhood@uta.edu](file:///C%3A%5CUsers%5Ckruzic%5CDesktop%5CClass%20Notes%20Folder%5C4355-5326%5Cjmhood%40uta.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/>.

**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>.

**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 north exit of the classroom, and out the north exit of the GACB. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. The instructor will assist individuals with disabilities.

**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](http://www.uta.edu/universitycollege/current/academic-support/learning-center/tutoring/index.php), [major-based learning centers](http://www.uta.edu/universitycollege/resources/college-based-clinics-labs.php), developmental education, [advising and mentoring](http://www.uta.edu/universitycollege/resources/advising.php), personal counseling, and [federally funded programs](http://www.uta.edu/universitycollege/current/academic-support/mcnair/index.php). 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/universitycollege/resources/index.php>.

**Librarian to Contact:** Sylvia George-Williams, Engineering Librarian, NH - B03D, Tel: 2-7519, Email: sylvia@uta.

**Course Schedule**

Week 1 Water and Wastewater Treatment Overview, Flow Definitions

Weeks 2-3 Closed Conduit Flow Equations, Flow Measurement and Control Devices

Weeks 4-6 Open Channel Fluid Flow Equations, Flow Measurement and Control Devices

Weeks 7-8 Water Pumps, Project 1 due end of Week 8

Week 9 Sludge Characteristics and Mass Balance

Week 10 Sludge Pumping and Piping

Weeks 11-12 Blowers, Compressors and Gas Piping

Weeks 13-14 Chemical Storage and Feeding, Project 2 due end of Week 13

Week 15 Term Paper is due last day of class

**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