

CE/AREN 3301
Stochastic Modeling for Civil Engineering
Spring 2018

Instructor: Dr. Kyung Kate Hyun

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Office Hours: Monday and Wednesday, 4pm-5:30pm or by appointment

Time and Place of Class Meetings: Monday and Wednesday, 2:30 – 3:50 pm, NH105

Teaching Assistant: Farah Naz (farah.naz@mavs.uta.edu),
Office Hours: Tuesday, 12:15pm – 3:15pm (NH B24)

Description of Course Content:

Basic theory of probability and statistics with practical applications to civil and environmental engineering problems. Emphasis on sampling, distribution functions, tests of significance, and regression modeling.

Student Learning Outcomes:

1. Ability to apply knowledge of mathematics, science, and engineering
2. Ability to design and conduct experiments, as well as to analyze and interpret data
3. Ability to identify, formulate and solve engineering problems
4. Ability to use techniques, skills, and modern engineering tools necessary for engineering practices
5. To learn basic theory of probability and statistics with practical applications to civil and environmental engineering, learn sampling, distribution functions, tests of hypothesis, and regression analysis
6. Learn to write clearly for homework
7. Learn to speak and write clearly when presenting projects

Prerequisite: Grade of C or better in Math 2425

Required Textbooks:

Probability, Statistics, and Reliability for Engineers and Scientists by Bilal M. Ayyub and Richard H. McCuen, Third edition, CRC Press 2011

Descriptions of major assignments and examinations:

Quizzes 5%
Homework 10%
Mid-Term I 20%
Mid-Term II 20%
Final Exam 30%
Project/Presentation 15%

Grades will be determined according to the following scale:

Grade	% Required
A	90-100
B	80-89
C	70-79
D	60-69
F	Less than 60

Software: Microsoft EXCEL or other spreadsheet

Homework

The homework should be submitted before the class hour on the day that it is due. I need the homework turned in by this date so that the TA can return the solutions to you within a week. If you are unable to attend class, please submit your homework via BLACKBOARD before the class. If the homework is not submitted, the maximum score will degrade 10% of the total score per day

Two mid-terms and Final (closed book)

Two midterm exams will last one hour and 20 minutes, and the final will be two hours.

While each test will focus on specific sections, any of the course objectives that have been covered to that point may be addressed. All of the problem solving will be closed book. If you are unable to attend these meetings or need to arrange testing center (only if you are an online student) you must make arrangements with me at least two weeks prior so that I can accommodate your needs.

Missed Exams

If an exam is to be missed, I should be contacted immediately. If I do not hear from you on or before the test day, and you do not have an adequate medical/family emergency (hospitalization/doctor's note/death certificate), you will receive a zero on the exam.

Project

For the project, a maximum of four students will form a group and each team will identify and collect a data sample. The data will be used to develop a model that forecasts future behaviors or results (the predicted inputs should be justified). The model and forecasted results should be analyzed and explained. Try to identify a research topic by February 19 and submit an optional half-page proposal that contains proposed data set and topics. I will provide guidance, comments, and recommendations for the optional proposal.

Presentation

The findings will be presented at the end of the course in a 10-15 minute presentation. The presentation should cover the research problem, methodology, data analysis and results. The presentations will be graded on content, clarity, and timeliness.

CE 3301 Schedule

Date	Topic	Text	Quiz / Assignment Due
Jan 17	Introduction Classification of data and descriptive measures	Chapter 1 and 2	
Jan 22	Graphical description of data and Histograms	Chapter 2	
Jan 24	Sample spaces and Mathematics of probability	Chapter 3	
Jan 29	Random variables and their probability distribution	Chapter 3	Homework #1 due
Jan 31	Excel data analysis I		Quiz # 1
Feb 5	Bernoulli distribution, Binomial distribution	Chapter 4	
Feb 7	Geometric distribution, Poisson distribution	Chapter 4	
Feb 12	Negative binomial and problems	Chapter 4	Homework #2 due
Feb 14	Midterm 1		
Feb 19	Various distributions	Chapter 5	Optional proposal due
Feb 21	Statistical probability distribution	Chapter 5	Quiz #2
Feb 26	Joint random variables and probability distributions	Chapter 5	Homework #3 due
Feb 28	Functions of random variables	Chapter 6	
Mar 5	Functions of random variables (cont'd)	Chapter 6	
Mar 7	Samples and populations and Properties of estimation	Chapter 8	Quiz #3
Mar 12-17	Spring break		
Mar 19	Maximum likelihood estimations	Chapter 8	Homework #4 due
Mar 21	General procedure of hypothesis testing	Chapter 9	
Mar 26	Midterm 2		
Mar 28	Hypothesis testing of means and variances	Chapter 9	
Apr 2	Tests of distributions	Chapter 9	Homework #5 due
Apr 4	Excel data analysis II		Quiz #4
Apr 9	Analysis of variance	Chapter 9	
Apr 11	Confidence intervals I	Chapter 10	
Apr 16	Confidence intervals II and Regression analysis I	Chapter 10	Homework #6 due
Apr 18	Regression analysis II	Chapter 10	
Apr 23	Regression analysis III	Chapter 10	Quiz #5
Apr 25	Presentation I		
Apr 30	Presentation II		Homework #7 due
May 2	Review for Final		Project report due

IMPORTANT SCHEDULE NOTE: *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.*

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 allow students to attend class at their own discretion; however, there will be a few unannounced quizzes held during class throughout the semester. Or, quiz schedules could be changed without notice to the students.

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/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)** 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. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@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/>.

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 nearest exit, which is located through the two doors at the front and back of the room. 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.

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/universitycollege/resources/index.php>.

University Tutorial & Supplemental Instruction (Ransom Hall 205): UTSI offers a variety of academic support services for undergraduate students, including: 60 minute one-on-one tutoring sessions, Start Strong Freshman tutoring program, and Supplemental Instruction. Office hours are Monday-Friday 8:00am-5:00pm. For more information visit www.uta.edu/utsi or call 817-272-2617.

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): [Optional.] 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: Martin Wallace, martin.wallace@uta.edu, 817-272-3924, Office Hours

<p>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</p>
