

CSE-2315-009 : DATA ANALYSIS & MODELING TECHNIQUES

Fall 2022

Instructor:	Shirin Shirvani	Time:	TR 5:30 pm– 6:50pm
Email:	shirin.shirvani@uta.edu	Place:	COBA 256

Description of Course Content:

The objective of this course is to provide students the basic data analysis and modeling concepts and methodologies using probability theory. Basic statics concepts and probability concepts will be covered. Fundamental data analysis and hypothesis techniques will be covered. Further data modeling methodologies such as Hidden Markov Models and Bayesian networks will be introduced.

Student Learning Outcomes:

Students successfully completing this course will have gained a solid understanding of probabilistic data modeling, interpretation, and analysis and thus have formed an important basis solve practical statistics and data analysis related problems arising in broad computer science and engineering, and daily life

Course Materials:

Probability and Statistics for Computer Scientists (3rd Edition) by Michael Baron, Chapman and Chapman and Hall/CRC (ISBN: 9781138044487). Note that you can also use the 2nd Edition. In addition, notes will be posted on Canvas.

Prerequisites:

All students are expected to have a background in basic probability, Calculus, and Algebra before attending this course. In particular, students should have passed the courses Engineering Probability (IE 3301), Algorithms and Data Structures (CSE 2320), Calculus II (Math 2425), and Differential Equations & Linear Algebra (Math 3319) or an equivalent. In case of questions, students should seek the consent of the instructor to attend the course.

Description of Assignments:

There will be several homework assignments in this course. Most of the tasks will require handwritten or typed solutions. Some assignments may have programming tasks. The solution to programming tasks can be programmed in base versions of C, C++, Java, Python2 or Python3 only. All homework submissions must be submitted via Canvas. No other method of submission accepted. If you find yourself in an emergency and cannot deliver homework on time, immediately inform the instructor. Also, while working with other persons on non-graded example problems from the textbook is a good way to help you develop your understanding and insight into the techniques of problem solving, homework solutions must be your work only. Violations of this will not be tolerated and result in severe penalties for all parties involved, in strict compliance to official UTA policy.

Description of Examinations:

There are three exams. Each will cover all material covered in the class until that point (weighted more towards material not covered in previous exams) with the Final Exam being a comprehensive exam. The exams are closed book/notes. You will need a scientific calculator (non-graphing, non-programmable) for doing calculations. Formula sheets will be provided for the exam (and will also be provided beforehand on canvas for review). No other material allowed. No exam scores will be dropped. The exams will be held on campus as in-person.

Grading Policy:

Homeworks(35%), Exam 1 (15%), Exam 2 (20%), , Examn 3 (Final) (30%)

Your average numeric score is then converted to a letter grade according to following rubric

(Numerical Score & Grade): [≥ 85 : A], [≥ 70 : B], [≥ 55 : C], [≥ 40 : D], [otherwise F]

These percentages and cutoffs are tentative and may be changed based on the distribution of scores and the degree of difficulty of the assignments and exams. 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.

Homework Assignments -	35%
Exam 1 -	15%, Oct 4
Exam 2	20%, Nov 8
Exam 3	30%, Monday, Dec 12 at 5:30 – 8 p.m.

E-mail and Canvas:

On Conavs, you will be able to see the course page. All changes and supplemental course materials will be distributed through Canvas. As a source that will be used to maintain an updated class schedule and post course materials. Besides posts on Canvas, necessary changes or important announcements will also be distributed by e-mail from Canvas. To receive these e-mails you have to make sure that you read your UTA (mavs.uta.edu) e-mails.

Tentative Office Hours:

- Time: T/R 6:50:pm- 8:00pm
- Time: Friday 3:pm- 5:00pm on TEAMS
- If you cannot meet me during offcie hour after class, you can also message me through TEAMS.

Times are subject to change and will be posted. If for some reason you can not make it to any of these office hours, please inform the instructor. e-mail: shirin.shirvani@uta.edu When contacting the instructor by email, please indicate the course number in the subject line of the email.

GTA Information:

Hemang Garapati is Teaching Assistant for the course.

- **Office Hours:** ERB 501 , M/W at 2:30-4pm
- **Email:** hxg0122@mavs.uta.edu. (If you cannot meet TA during this time, you can also message through TEAMS)

0.1 Late submission policy:

The points each assignment graded out of will be provided as part of its description. Assignments submitted late will be automatically penalized, at a rate of 5% of max points per hour late. Note that for some assignments, Late submissions may not be accepted (will be announced in class). The submission due time (and the time the link will be available till) will be shown in canvas. Exceptions will only be made for documented emergencies, in strict adherence to UTA policy. Computer/Network crashes, Submission of Incomplete files, Submission of Incorrect Files, Submitting at Incorrect Link are NOT acceptable excuses for late submissions. No exceptions will be made. To avoid problems with such crashes and last-minute problems, students are encouraged to submit as early as possible. They are also advised to ensure that their file was uploaded correctly before submitting it. You can always revise your submission till the deadline. If you are unable to work on/submit an assignment due to a valid documented reason (illness, critical family emergencies, military service obligations, observance of major religious holidays, and certain university service commitments) one makeup assignment may be provided that will be due during finals week.

0.2 Exam Absence policy:

Absence from exams may be excused, with appropriate documentation, for illness, critical family emergencies, military service obligations, observance of major religious holidays, and certain university service commitments. Requests for excused absence, and documentation for such absences, must be provided as soon as possible. In case of excused absence, a makeup exam will be setup and conducted by the instructor at a date before the last day of finals week. Even if the reason for an absence/non-attendance is valid, a request for an excused absence/re-attempt will be rejected if provided later than the day of the exam. The dates for all the exams are subject to change. Any changes will be announced in class atleast a week in advance. Students are expected to be available till the last day of finals week. No accommodations will be made if the student will miss an exam due to being unavailable before the last day of finals week.

0.3 Attendance:

Attendance Students are expected to attend all lectures. Attendance will be taken during every lecture that occurs after census date and will be part of your final grade. Any material that the student missed will not be covered again in class. At random points during the lectures, I will conduct in class quizzes. The scores of these quizzes will be used as part of your final grade. Absence from classes may be excused, with appropriate documentation, for illness, critical family emergencies, military service obligations, observance of major religious holidays, and certain university service commitments. Documentation regarding any reasons for absence must be provided to the instructor by the end of the week of the missed lecture. If the student is unable to attend a class due to approved or personal reasons, it is the student's responsibility to use the material posted online or the lecture archives on canvas and the textbook to learn the content and to contact either the Instructor or the TA to clarify any doubts At the University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of 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 be following the attendance policy described above. 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 must 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 Canvas. This date is reported to the Department of Education for federal financial aid recipients.

1 University Policies and Services

1.1 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 undergraduate catalog.

1.2 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/>).

1.3 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.

1.4 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

1.5 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/>.

1.6 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>.

1.7 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/>

1.8 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: 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.

1.9 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 to the right of the room exit and out of the building. 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.

1.10 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>.

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>

Tentative Lecture and Assignment Schedule:

The page schedule is tentative and subject to change. If changes are necessary they will be announced and posted in the schedule on the course page.

Class	Date	Readings	Lecture Topics	Assignments
1	08-23		Course Details and Overview	
2	08-25		Probability and Random Variables	
3	08-30			
4	09-1		Distributions	
5	09-06			
6	09-13		Continuous random Variables	
7	09-15			
8	09-20		Central Limit Theorem	
9	09-22		Information Theory	
10	09-27		Sampling, Descriptive Statistics	
11	09-29		Graphical Statistics	
12	10-04		Conclusions and Review	
13	10-06		Exam 1	
14	10-11		Confidence Intervals	
15	10-13		Confidence Intervals(Contd.), Hypothesis Testing	
16	10-18			
17	10-20		Bayesian Networks	
18	10-25		Monte Carlo Methods	
19	10-27		Conclusions and Review	
20	11-01		Exam 2	
21	11-03		Stochastic Processes, Markov Processes	
22	11-08			
23	11-10		M/M/1 Systems, Multiserver Systems	
24	11-15			
25	11-17		Hidden Markov Models	
26	11-22			
27	11-24			
28	11-29		Queuing Systems	
29	12-01			
31	12-06		Conclusions and Review	
32	012-12		Final Exam	