1 Course Description:

with Computer Science moving into applications in the real world and involving large quantities of data, uncertainty and random variations become increasingly important aspects to be considered when designing algorithms, addressing large scale problems, modeling processes, or evaluating data. To do this, probabilistic methods for data analysis and modeling become essential tools within every branch of Computer Science. This course briefly covers basic statistics and probability concepts and introduces techniques to model and analyze probabilistic data. This includes basic representation such as Bayesian networks as well as hypothesis testing techniques for data analysis and interpretation. Further, it introduces modeling and analysis techniques for sequential processes, including Markov models, regression analysis, and basic queueing models. All of these techniques will be discussed in the context of common Computer Science problems from a wide range of fields, including Computer Networks, Artificial Intelligence, Machine Learning, Computer Vision, Data Mining, Bioinformatics, etc.

2 Contents and Objectives:

Introduction to applied analysis. Topics include concepts in the design of empirical computer science research and the application of the appropriate associated statistical analysis methods; the nature and importance of scientific hypotheses in computer science, the design of valid experiments to test such hypotheses, and the basic techniques of applied statistical analysis including the exploration of the meaning of results and methods of describing data on individual variables and examining association between variables including estimation, tests of mean differences, differences in distributions, and correlation between variables; random sampling, probabilities, and independent and identically distributed data concepts are discussed as a basis for understanding how to infer results from samples to the populations from which they are drawn.

3 Covid Policy and Guidance:

Students are expected to attend class meetings regularly and to abide by the attendance policy established for the course. It is important that you communicate with the professor and the instructional team prior to being absent, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings because you are ill, in mindfulness of the health and safety of everyone in our community.

If you are experiencing any symptoms of COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus.

UNT also requires you to contact the UNT COVID Team at COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure.

4 Tentative Office Hours:

- Time: Monday-Wednesday 2:30pm - 4:00pm F203, Zoom https://unt.zoom.us/j/9547135706

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@unt.edu When contacting the instructor by email, please indicate the course number in the subject line of the email starts with CSCE5310.
5 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 UNT (unt.edu) e-mails.

Tentative Office Hours:

GTA Information: Check Canavs for information

6 Course Materials:

There are a wide range of books on this topic, all of which cover many of topics covered in the course and can be used as references for the course. However, none of them covers everything in the course. As a consequence the course does not follow any one specific textbook. Additional course materials if needed will be available electronically through Canvas. Also, changes, if any, will be announced by e-mail.

7 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, Algorithms and Data Structures, Calculus II, and Differential Equations & Linear Algebra or an equivalent. In case of questions, students should seek the consent of the instructor to attend the course.

8 Tentative Schedule:

1. Course Overview & Introduction Course Overview
2. Probability
3. Statistics
4. Joint Distributions, Conditional Distributions, Bayesian Networks
5. Sampling Methods, Central Limit Theorem and Confidence Intervals
6. Hypothesis Testing and ANOVA
7. Regression and Parameter Estimation
8. Correlation and Linear Regression
9. Multiple and Logistic Regression

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

9 Grading Policy:

The final grade will be calculated using the following policy:

<table>
<thead>
<tr>
<th>Homework Assignments</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>30%</td>
</tr>
</tbody>
</table>
Homeworks (50%), Exam 1 (20%), Exam 2 (30%).
Your average numeric score is then converted to a letter grade according to following rubric
(Numerical Score & Grade): [>= 88 : A ], [>= 78 : B ], [>= 68 : C ], [>= 58 : 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.

10 Assignments and Grading:

10.1 Homework Assignments:
There will be 6 homework assignments in this course, each covering approximately 6 class periods. Assignments are due in or before class on the date indicated on the assignment and solutions will be posted before the next class period. Late assignments will be penalized.

10.2 Exams:
All 2 exams in the course are closed book and be hold online with Lock-Down Browser, closed notes. The exam 2 is cumulative and will cover all materials of the course. As in the case of homework extensions, make-up exams will only be given in extreme situations. If for any such reason you can not attend an exam, inform the instructor as early as possible.

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. If the exam is disrupted due to a service outage screenshots/ photographic evidence must be provided ASAP. In case or excused absence or outage, a makeup exam will be setup and conducted by the instructor. 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.

10.3 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 10% of max points per day 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 UNT 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.

10.4 Attendance:
Students are expected to attend either online or in-person lectures. Attendance in the lectures will be part of your final grade. Any material that the student missed will not be covered again in class.

11 Academic Integrity and Collaboration:
UNT policy 06.003 defines the following breaches of academic integrity:

- **Cheating.** The use of unauthorized assistance in an academic exercise, including but not limited to:
  - use of any unauthorized assistance to take exams, tests, quizzes or other assessments;
• Usage of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; usage without permission, of tests, notes, or other academic materials belonging to instructors, staff members, or other students of the university;
• Dual submission of a paper or project, or resubmission of a paper or project to a different class without express permission from the instructor;
• Any other act designed to give a student an unfair advantage on an academic assignment.

• Plagiarism. Use of another’s thoughts or words without proper attribution in any academic exercise, regardless of the student’s intent, including but not limited to:
  • The knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgement or citation.
  • The knowing or negligent unacknowledged use of materials prepared by another person or by an agency engaged in selling term papers or other academic materials.

• Forgery. Altering a score, grade or official academic university record; or forging the signature of an instructor or other student.

• Fabrication. Falsifying or inventing any information, data or research as part of an academic exercise.

• Facilitating Academic Dishonesty. Helping or assisting another in the commission of academic dishonesty.

• Sabotage. Acting to prevent others from completing their work or willfully disrupting the academic work of others.

Cheating of any sort will not be tolerated in this course. All submissions must be your own original work. Taking information or code from the internet or other students is considered a breach of academic integrity. Failure to adhere to these strict standards will be cause for disciplinary action that could be as severe as expulsion from the university. If it is determined a student cheated on any assignment in this course they will receive an F for their final course grade and an academic integrity report will be filed with the Office of Academic Integrity. Further, UNT is now maintaining a database recording any acts of academic dishonesty that is available to employers. Additionally, because these are group projects, if one group member is caught cheating the consequences of their actions will extend to the group as a whole. It is the responsibility of all group members to insure that when they put their names on their submission as a whole and submit it, the submission does not contain any instances of cheating. Failure to report known instances of cheating within a group will be deemed facilitation of academic dishonesty and reported as such. For more information see the UNT Student Academic Integrity Policy.

Collaboration Policy:
For each project submission, all work is expected to be your own. While you should be working with your group members, you are not to collaborate with other groups for projects, provide solutions to other groups, search for solutions on the internet, or purchase solutions. Doing so will be deemed a breach of academic integrity. However, for any non-graded, practice assignments students are encouraged to work together to solve problems.

ODA:
The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time, however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940.565.4323.
Syllabus Revisions:
This syllabus may be modified as the course progresses should the instructor deem it necessary. Notice of changes to the syllabus shall be made through Canvas and/or in-class announcements.