

Course Syllabus

Fall 2024

CS-SE-STAT 3341.006

Probability and Statistics in Computer Science and Software Engineering

Time and Location: 1:00 PM to 2:15 PM Tuesday and Thursday ECSS 2.412

Instructor:	Shengjie Jiang
Email:	Shengjie.jiang@utdallas.edu (Please include the course # and section # in your email)
Office:	FN 2.208
Office Hours:	3:00 PM – 4:00 PM Tuesday and Thursday or by appointment
Office Phone:	972-883-6677
TA:	TBD
TA Email:	TBD

Course Pre-requisites

(MATH 1326 or MATH 2414 or MATH 2419), and (CE 2305 or CS 2305 or TE 2305 with a grade of C or better).

Course Description

Axiomatic probability theory, independence, conditional probability. Discrete and continuous random variables, special distributions of importance to CS/SE, and expectation. Simulation of random variables and Monte Carlo methods. Central limit theorem. Basic statistical inference, parameter estimation, hypothesis testing, and linear regression. Introduction to stochastic processes. Illustrative examples and simulation exercises from queuing, reliability, and other CS/SE applications.

Textbook

• Probability and Statistics for Computer Scientists, 2ed, Michael Baron. ISBN: 978-1-4398-7590- 2. Free e-book is available: UT Dallas library webpage > Databases > click letter “O” > click O’Reilly Online Learning > login > searching the textbook.

Required Supplies

- TI 83/84 is required for homework, quizzes, and exams. The instructor will provide instructions and demonstrate the use of the tool. Use other tools to do your homework is okay, such as Excel and MatLab. However, students are responsible for learning the tools of their choice.
- SCANTRONS, form F-1712-PAR-L (one for each exam; you will also need a no.2 pencil and a good eraser)



Learning Objectives

- Learn the basic probability rules and concepts, how to apply them, and when they don't apply
- Understand probability distributions and use them to answer probability questions
- Relate calculus to probability and use calculus to solve some probability problems
- Learn the basics of Markov chains and how to use matrices for finite-state chains
- Have an introduction to classical statistical inference (confidence intervals, hypothesis tests) and to how calculus may be used (parameter estimation)

Grading Policies

Distribution:

15% Homework
20% Quizzes
30% Exam #1
30% Exam #2
5% Class Participation

Criteria:

A+: [97, ∞) A: [93, 97) A-: [90, 93)
B+: [87, 90) B: [83, 87) B-: [80, 83)
C+: [77, 80) C: [73, 77) C-: [70, 73)
D+: [67, 70) D: [63, 67) D-: [60, 63)
F: [0, 60)

Homework: There will be ten Homework sets on eLearning, and the one with the lowest grade will be counted as extra credits. Students must scan their work into a single PDF file and submit it through the link within eLearning. **Homework submitted through email to me will not be accepted.** Adobe Scan is a free and good phone/tablet App to scan your homework.

Quizzes: There will be eight 30-min quizzes online after class. The lowest quiz score will be dropped, so there are **no make-up quizzes**.

Exams: There will be two closed-book and closed-note exams. One-side page (8.5*11 inches) of the formula sheet is allowed, and you can write or print anything you want on this sheet. Exams will be scantron and please remember to bring your calculator and pencils. No device with Wi-Fi is allowed during the exam.

Class Participation: You will also receive several random quizzes during class this semester. The Random quiz questions are related to the material in the same-day class. Please bring a laptop to each class.

Tentative Course Outline (**Tentative**)

Week	Date	Topic
1	Aug 20	Syllabus overview & Chapter 2 Probability basics
1	Aug 22	Chapter 2. Set operations
2	Aug 27	Chapter 2. Rules of probability
2	Aug 29	Chapter 2. Conditional probability and independence
3	Sep 3	Chapter 2. Bayes' Rule and Law of Total Probability
3	Sep 5	Chapter 2. Combinatorics
4	Sep 10	Chapter 3. Discrete random variables
4	Sep 12	Chapter 3. Bernoulli and Binomial distribution
5	Sep 17	Chapter 3. Geometric and Poisson distribution
5	Sep 19	Chapter 4. Continuous random variables and Uniform distribution
6	Sep 24	Chapter 4. Exponential distribution
6	Sep 26	Chapter 4. Gamma distribution
7	Oct 1	Chapter 4. Normal distribution
7	Oct 3	Chapter 4. Central Limit Theorem
8	Oct 8	Exam Review
8	Oct 10	Chapter 6. Stochastic Processes
9	Oct 15	Midterm Exam
9	Oct 17	Chapter 6. Markov Chains
10	Oct 22	Chapter 8. Intro to Descriptive Statistics
10	Oct 24	Chapter 8. Intro to Graphical Statistics
11	Oct 29	Chapter 9. Parameter estimation
11	Oct 31	Chapter 9. Parameter estimation
12	Nov 5	Chapter 9. Confidence interval
12	Nov 7	Chapter 9. Confidence interval
13	Nov 12	Chapter 9. Intro to Hypothesis Testing
13	Nov 14	Chapter 9. Significance Tests
14	Nov 19	Chapter 9. Significance Tests
14	Nov 21	Chapter 11. Linear Regression
15	Nov 25-29	Thanksgiving Holiday
16	Dec 3	Chapter 11. Linear Regression
16	Dec 5	Chapter 11. Linear Regression
17	TBD	Final Exam

Course Policies

eLearning: Lecture Notes, Assignments, Quizzes, course announcements, etc., will be posted on eLearning. You are encouraged to check eLearning and UTD email daily to keep up to date.

Make-up Exams: If the absence is known in advance, please email me at least one week before the exam. You must contact me immediately if the absence is not known in advance (illness). If the absence is not excused, the further missed exam receives a grade of zero. To treat all students fairly, please do not request special projects, extra credit, rounded scores, or any other special treatment.

Late Homework: Not accepted. Solutions will be posted on eLearning after the due date of HW.

Make-up Quizzes: No make-up quizzes. Since quizzes are on eLearning, late submission is not an option; thus, the missing quizzes will receive a grade of zero.

Class Attendance: You are encouraged to attend all classes as the course will move quickly. The instructor will not make any accommodations for missing a class. Those who do not attend class are inviting scholastic difficulty.

Comet Creed: This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: “As a Comet, I pledge honesty, integrity, and service in all that I do.”

UT Dallas syllabus policies and procedures: The information contained in the following link constitutes the University’s policies and procedures segment of the course syllabus. Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.