

Course Syllabus for STAT/CS/SE/ENGR 3341

The content of this syllabus may change at the discretion of the instructor.

Instructor information:

Tristan Whalen

Office: FN 2.206

Office Hours: Mon/Wed 4pm – 5pm, Tues 2:45pm – 3:45pm, and by appointment

Email: tgw100020@utdallas.edu

Course prerequisites:

MATH 1326 or MATH 2414 or MATH 2419, and

CE/CS/TE 2305

Course content:

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.

Learning objectives:

Students will learn fundamental rules of probability, discrete and continuous distributions, and statistical methods most commonly used in computer science and software engineering. They will be introduced to stochastic processes, Markov chains, statistical inference, and Monte Carlo methods, and they will apply the theory and methods to the evaluation of queuing systems and the computation of their vital characteristics.

Required textbook:

Probability and Statistics for Computer Scientists, by M. Baron, Chapman & Hall/CRC Press (2014), Second Edition ISBN 9781439875902

A calculator or a scientific calculator is required and is permitted on quizzes and exams. However, mobile phones are not permitted on exams.

Quizzes and Homework:

A quiz will be given in class each week, except for the first week and exam weeks.

Homework is assigned online via WebWork. You will each be given a user name and password to access WebWork.

On UTD campus, to login use

<https://euler.utdallas.edu/webwork2>

Off campus, you must first go to

<https://utdvpn.utdallas.edu/>

and sign in with your NetID and password. Then type the on campus web address into the search box in the top right.

Tentative Calendar*:

Aug 24-27 Introduction. Events and outcomes. 1,2.1, 2.2

Aug 31-Sept 3 Probability rules. Combinatorics 2.2, 2.3

Sept 7-10 Conditional probability. Independence. Bayes' Rule. Law of Total Probability. 2.4

Sept 14-17 Random variables and random vectors. Joint and marginal distributions. Expectation and variance. 3.1, 3.2, 3.3

Sept 21-24 Discrete distributions: Bernoulli, Binomial, Geometric, and Poisson. 3.4

Sept 28-Oct 1 Continuous distributions and densities: Uniform, Exponential, Gamma, Normal 4.1,4.2

Oct 5-8 Review and Exam 1-4

Oct 12-15 Central Limit Theorem and Normal approximations. 4.3

Oct 19-22 Stochastic processes: concepts and classifications. Bernoulli process. Poisson process. 6.1,6.3

Oct 26-29 Markov chains. Transition probabilities. Steady-state distribution. 6.2, 6.3

Nov 2-5 Discrete-time queuing systems. Bernoulli single-server queuing process. Limited and unlimited capacity. 7.1, 7.3

Nov 9-12 Continuous-time queuing processes. M/M/1 system and its steady state. 7.4

Nov 16-19 Statistical inference. Parameter estimation. 8.1, 9.1

Nov 30-Dec 3 Confidence intervals and hypothesis testing. 9.2-9.4

Dec 7-9 Review Ch 2-9

***Instructors reserve the right to change the dates and schedule if necessary.**

Exam and holiday dates:

Sept 7 – no class – Labor Day

Oct 7 – Midterm

Nov 23-28 – no class – Thanksgiving

The final exam will be determined by the UTD final exam schedule.

Grading:

10% Homework

25% Quizzes

25% Midterm

40% Final exam

A+: [97, 100], 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)

Course and instructor policies:

You are expected to attend all class sessions. If you choose to stop attending class, it is your responsibility to drop the course.

There are no make-ups of the midterm and final exam without prior arrangement with the instructor.

You are welcome to email me, visit during my office hours, or email to request an appointment.

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.

<http://go.utdallas.edu/syllabus-policies>