Course Syllabus for CS-SE-STAT 3341
Spring 2021
Dr. Tristan Whalen
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Please include 3341.001 in every email to me
All times refer to Dallas time (CST / CDT after March 14)

Quest overview (class at a glance):

1. Lectures—watch live or watch later, your choice. Attend class live in Blackboard Collaborate Monday and Wednesday 11:30am – 12:30pm. Watch a recording later either within Collaborate or in Microsoft Stream.
2. Homework—one set of online homework problems each week for that week's topic. Assigned in Webwork.
3. Quizzes—take in elearning. These are timed, but you may begin anytime on a quiz day (12:01am to 11:59pm). Prepare for quizzes like a mini-exam. Quizzes occur about once every two weeks on a Thursday

Want to take this course off the clock (asynchronously)?
You may consider this class "asynchronous" (off the clock) by default, and you do *not* need to notify me if you choose to take it this way. Note that "asynchronous" does not mean "acalendrical"—you are expected to keep up with material on a weekly basis, and take homework and quizzes during the time frames they are available. Quizzes are available to begin during a 24-hour window most Thursdays. Of course, notify me as soon as possible if an emergency prevents you from taking a quiz.

Instructor information:
Instructor: Dr. Tristan Whalen | Email: tristan.whalen@utdallas.edu
Office hours: by appointment in the online classroom
Please include 3341.001 in every email for this class.
Please email me throughout the semester with questions about class topics or to request an office appointment.
Do not hesitate to get help for this course!

Required materials:

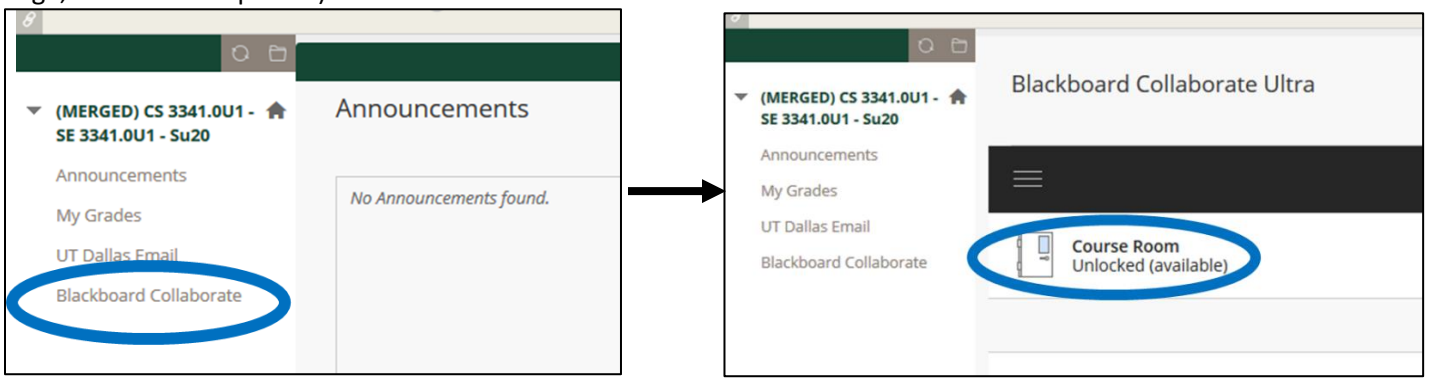
- **Prerequisites:** Calculus 2 (MATH 1326, 2414, or 2419), and Discrete Math 1 with grade of C or better
- **Reliable internet access:** class lecture, office appointments, and all assignments will occur online. You do *not* need a webcam, tablet, or microphone.
- **NetIDplus enrollement:** if you have not already, follow the instructions here:
  https://oit.utdallas.edu/howto/netidplus/
- **UTD VPN connection:** follow the instructions here:
  https://oit.utdallas.edu/howto/vpn/
  Make sure you connect successfully to utvpn.utdallas.edu. Once you have, this page will load:
  https://fourier.utdallas.edu/webwork2
- **Course Material:** Instructor notes: Lessons, Exercises, and Solutions in 13 topics, and lecture notes posted after lecture, both in elearning.
- **Calculator and/or simple data software:** you are required to have software or a calculator with probability functions for class, homework, and quizzes. Here are some options:
  - Geogebra: Free math software available at geogebra.org. Use in browser or download and install (recommended) *Geogebra Classic 5*.
  - Microsoft Excel
  - Many graphing calculators; I use TI-84plus.
  - In class, I use the downloadable *Geogebra Classic 5* or Microsoft Excel to demonstrate calculations.
- **Optional text:** *Probability and Statistics for Computer Scientists*, 2ed, Michael Baron

Grading rules:
Your grade is based on online quizzes (taken in elearning) and online homework (in webwork).

The average of all your quiz scores and your homework score equals your course grade, with letter mapping shown here. An example is below.

A+: $(97, \infty)$ 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: $[0, 60)$
To keep grading fair, no rounding and no honoring special requests.

Online lecture:
This course uses the Blackboard Collaborate online classroom. To find it, choose this course in elearning, then choose "Blackboard Collaborate" in the left-hand menu. Use Firefox or Chrome. (Blackboard Collaborate does not work in Safari, Edge, or Internet Explorer.)



Classroom policies:

- Be courteous to other students and the instructor in the online classroom.
- If you use the chat option, please keep it appropriate.
- At the instructor's discretion, you may be removed from the online classroom and/or receive a grade penalty for misuse of the chat or anything else that interferes with class.

Homework:

- Problems to help you practice the formulas and concepts will be posted online in *Webwork*.
- Webwork is free to use, but you must connect to UTD's VPN to access. *See the list of course materials on the first page for links to the OIT tutorials to do this.*
- Webwork problems are all equally weighted in one homework average. Your homework score equals the number of problems answered correctly divided by the number of required problems. By the end of the semester there will be around 200 problems total, give or take 50 or so.
- Typically, *homework sets are considered due on Tuesday nights, 24 hours before the due date listed in webwork.*

Quizzes:

- Taken in elearning; choose the Quizzes item on the left menu.
- Typically, quizzes will occur on alternating Thursdays; but please see the schedule below.
- All quizzes are timed, but you may begin your quiz anytime on a quiz day, 12:01am to 11:59pm.
- Allowed during quizzes: Anything from Instructor Whalen posted in elearning (such as lecture notes), your own personal notes, and a calculator of your choice (including Geogebra, Excel, TI graphing) are all permitted during quizzes. But beware—preparation in advance is expected!
- Forbidden: Getting or giving help about a quiz with anyone, in any way, is cheating. Using online forums or sources is also cheating. Using someone else's notes during the quiz is not allowed. Before quiz day, it is a good idea to review material with other students and other sources. But the quiz itself must be you on your own, with the permitted materials.

Assignment and grade policies:

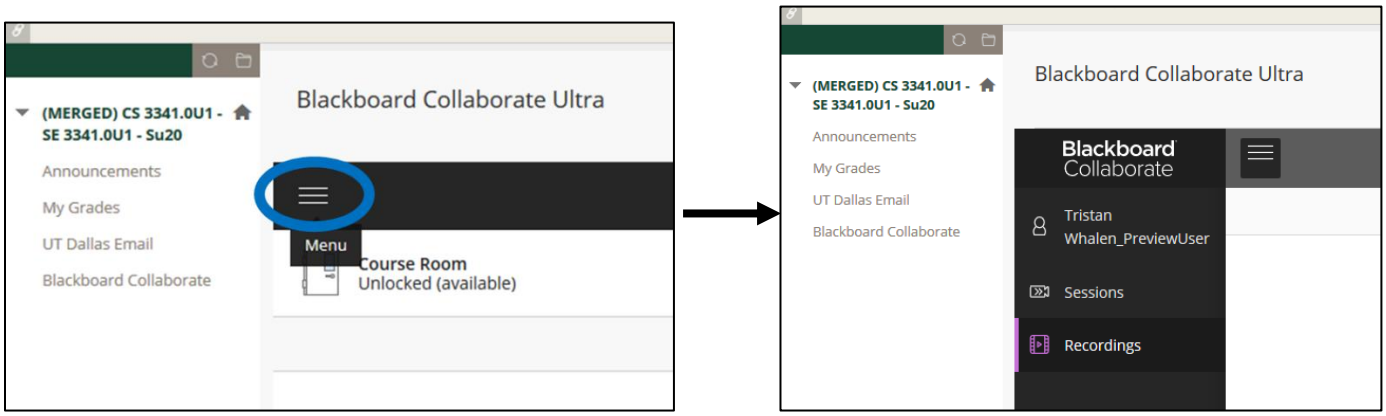
- If an emergency prevents you from taking a quiz, notify Instructor Whalen *as soon as possible*.
- If you miss a quiz entirely, you will be given a score of 0 for that quiz.
- Finish homework at least 24 hours in advance of the due time shown in webwork. There are no extensions or make-ups of homework.
- To treat all students fairly, the instructor *ignores* requests for bonus points, rounding, special projects, extra assignments, extra tests, and so on.

Lecture Recordings:

If you cannot attend live lecture, watch the recording of it later. Do you need closed captioning (subtitles)?

If you do *not* need closed captioning…

Blackboard automatically posts the recording within a few hours of the end of class, once it has been processed. Here is where to find them:



If you *do* need closed captioning…

Lecture recordings will be uploaded to Microsoft Streams with captions generated. Instructions to access these will be posted separately on the course homepage in elearning. (You may already have Microsoft Streams instructions.)

University restrictions about class recordings
Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, *students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments* except to implement an approved Office of Student AccessAbility accommodation. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

University restrictions about class materials (lecture note files, instructor notes, etc.)
The materials posted by the instructor may be downloaded during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

University technical requirements and help
In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the Getting Started with eLearning webpage.

This course can be accessed using your UT Dallas NetID account on the eLearning website. Please see the course access and navigation section of the Getting Started with eLearning webpage for more information. To become familiar with the eLearning tool, please see the Student eLearning Tutorials webpage.

UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The eLearning Support Center includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online eLearning Help Desk. The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

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 when they apply
- Relate calculus to probability and use calculus to solve some probability problems
- See how to construct certain models "from scratch" (e.g., Binomial, Erlang), see what assumptions underly the mathematics involved
- Learn the basics of Markov chains and how to use matrices for finite-state chains
- Use linear correlation and regression, understand formulas and concepts, and be aware of certain fallacies
- Have an introduction to classical statistical inference (confidence intervals, hypothesis tests) and to how calculus may be used (parameter estimation)
- Be able to read over statistics writings and graphs with a basic understanding and healthy skepticism, and to have a critical eye for fallacies or misinterpretations.

Topic [instructor notes number] / Baron textbook section (optional supplement) / major prerequisites

Probability Basics [01] / 2.1-2.2

Interpretations, axioms, addition rule and mutual exclusive events, multiplication rule and independent events

Bayes' Rule [02] / 2.4

Conditional probability, law of total probability, Bayes' formula

Random Variables and Discrete Distributions [03] / 3.1

Probability distributions, random variables, probability mass functions, cumulative probability functions

Bernoulli-Based Distributions [04] / 3.4 / infinite series, geometric series

Bernoulli trials, Binomial experiments, Geometric experiments

Measures of Center and Spread [03, 10] / 3.3

Average and Expected Value, Standard Deviation and Error, Properties, Roulette examples

Calculus and Probability [04, 05] / 3.4, 4.1 / limits at infinity, differentiation, fundamental theorem of calculus, integration, improper integrals

Poisson distribution, probability density, derivatives and integrals of probability functions, probability as area

Continuous Distributions [06] / 4.2 / integration, fundamental theorem of calculus

Normal (Gaussian), Uniform, Exponential, center and spread integrals

Poisson Processes [07] / 6.1, 6.3 / differentiation

Basics of processes, modifying Poisson, Exponential inter-arrival time, Erlang time

Markov Chains [08] / 6.2 / matrices, matrix multiplication, solving system of linear equations

Process discussion, Markov diagrams, basic short-term forecasts, notation and matrices, long-term forecasts

Linear Correlation and Regression [09] / 11.1

Scatterplots, motivation and definition of correlation, basic regression method, residuals, r.m.s.-error, least-squares method, concepts and warnings

Central Limit Theorem [10] / 4.3

Sums of random variables, IIDs, expected value and standard error, illustrations of normal approximations, examples of calculation, Central Limit Theorem statement

Confidence intervals for unknown proportions [11] / 9.2, 9.3

Intro to statistics reasoning, importance of probability methods, using large random samples to estimate an unknown proportion and its standard error

Confidence intervals for unknown averages [11] / 9.2, 9.3

Use a large random sample to estimate an unknown average and its standard error, issues with small random samples, Student's (William Gosset's) t-curves, measurement error

Hypothesis tests [12] / 9.4

Intro to testing a null hypothesis, test-statistics and estimating P-values, concepts and issues

Parameter estimation methods with calculus [13] / 9.1 / integration, first and second derivative tests, logarithmic differentiation

Moments, Method of Moments, Method of Maximum Likelihood

Expected Quiz Dates:

February 4

February 18

March 4

March 25

April 8

April 22

May 6

May 13

All the dates above are Thursdays. There is no quiz during spring break (Thursday, March 18). Note that the last quiz on May 13 occurs during finals period.

Quizzes are all cumulative unless otherwise noted, because many topics build on previous topics. However, greater emphasis is placed on the "new" material. Length of quizzes varies by topics, but expect around 10 questions per quiz, and around one hour allowed for the quiz. The topics on a quiz cover through the previous week's lectures.

Homework due dates:
Every Tuesday, beginning February 2, until May 11. Webwork will list the due date as Wednesday. If there is a quiz on Thursday, it will cover through the material on the homework due Tuesday. (For example, the quiz on Thursday, March 4 covers material up to and including the material on the homework due Tuesday, March 2.)

Midterm grade:
March 13 is our deadline. Your midterm grade will be the average of the first three quizzes.

Spring Break:
March 15 - 20

EXAMPLE of grade calculation:

It is recommended that you calculate and track your grade yourself (say, in Microsoft Excel) during the semester. That way, you will know your standing each week and will not be surprised at the end.

Here is an example to show you how.

*********This is only an example; it uses hypothetical numbers to illustrate the calculations.*********

****The actual number of quizzes, and the actual number of points on each quiz, will be different.****

Suppose there are five quizzes. Bob took them all and completed most of the homework. Here are his points compared to the required points:

Quiz	Bob's points	Required points
1	9	10
2	12	20
3	4	5
4	11	10
5	8	12
webwork	117	125

Note that a quiz may allow bonus points—that's how on quiz 4, Bob got 11 points when only 10 were required.

Bob's score on each quiz equals his points, divided by the required points:

Quiz	Bob's score
1	9/10 or 90%
2	12/20 or 60%
3	4/5 or 80%
4	11/10 or 110%
5	8/12 or about 66.666667%
webwork	117/125 or 93.6%

Scores are not rounded manually, but elearning typically rounds to six decimal places. Bob's score of 8/12 cannot be written with finitely many decimal places, so in elearning it is rounded to 66.666667%.

Bob's grade is the average of these six scores:

$$\frac{90\% + 60\% + 80\% + 110\% + 66.666667\% + 93.6\%}{6} = \frac{500.266667}{6} \approx 83.377777833\%$$

So, Bob got a B in the class.

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

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.

https://go.utdallas.edu/syllabus-policies

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."

Academic Support Resources
The information contained in the following link lists the University's academic support resources for all students. Please go to Academic Support Resources webpage for these policies.