

## Math 3342-102 – Summer II 2020

**Instructor:** Dr. Jeffrey Lee  
**Contact Options:** Either use WebAssign (see below) or my email jeffrey.lee@ttu.edu  
**Class Times** MTWRF 12:00-13:50  
(We will not always meet nor will we always meet for the entire period)  
**Office Hours:** 14:00 AM – 15:00 PM M-Th  
**Text:** Probability and Statistics for Engineering and the Sciences, 9th Edition, Jay L. Devore.  
NOTE: Please pay special attention to the WebAssign section below.

### Important Dates:

July 7                      Classes begin  
July 22                    Last day to drop a course  
August 5                  Last day of classes  
August 6                  Final Exam. See discussion below on duration and times.

### Course Outline: (Approximate)

Chapter 1: 1.1-1.4	Chapter 6: 6.1 (6.2 optional)
Chapter 2: 2.1-2.2, 2.4-2.5 (2.3 optional)	Chapter 7: 7.1-7.4
Chapter 3: 3.1-3.4, 3.6 (3.5 optional)	Chapter 8: 8.1-8.5
Chapter 4: 4.1-4.5	Chapter 9: 9.1-9.5
Chapter 5: 5.3-5.4 (selected topics)	

### Expected Learning Outcomes and Assessments:

Students will apply their calculus knowledge to learn the meanings of, and computational procedures relating to, basic statistical concepts used for making decisions in the sciences and engineering. In particular, students will

- Understand the need to be wary of statistical claims, common pitfalls in sampling, and misrepresentation of conclusions.
- Understand the meanings of various statistical measures, including the mean, median, mode, standard deviation, variance, and quartiles.
- Become familiar with various graphical representations of data and learn to recognize misleading graphs.
- Develop proficiency in real-world probability problems.
- Understand the concept of a probability distribution and real-world problems involving various distributions, including the binomial, normal, hypergeometric, and Poisson distributions.
- Understand and apply the Central Limit Theorem.
- Compute and interpret confidence intervals.
- Conduct and interpret hypothesis tests.

Assessment of the learning outcomes will be achieved primarily through online exams and homework/quizzes administered through the WebAssign system (see the WebAssign section below). Extra credit assignments and/or take-home assignments or projects will be assigned at the discretion of the instructor and will be a part of the quiz grade or exam grade, also at my discretion. Class grades will be assigned according to the following:

### Grading:

There will be one midterm exam and the final exam, each worth 200 points (40% each). Homework will be worth 100 points (20%). The grading scale is as follows:

Grade	Points
A	448-500
B	398-447
C	348-397
D	298-347
F	0-297

**Exam Dates:**

The dates for the exams are as follows:

Midterm: Wednesday, June 17

Final: (TBA but around August 6 or 7)

**WebAssign:**

This course will utilize the WebAssign system for homework and exams. It can also be used for communication with me (in addition to emailing me). Obtaining access to WebAssign is mandatory, and you should log into it every day to check for announcements and homework assignments I may fail to mention in class.

While you are free to obtain a hard copy of the textbook, when you sign up for the course in WebAssign (and pay for access), it will include an electronic copy of the textbook automatically.

Website address: <http://www.webassign.net>

The Class Key for this course is

Any time it asks for your institution, enter "ttu".

Please choose a username for WebAssign that matches your TTU email address. For example, I would use "jeffrey.lee" as my username since my TTU email is "jeffrey.lee@ttu.edu". Furthermore, please use the name that TTU has on record for you.

There is an area in WebAssign where you can ask me questions. I plan to be logged into WebAssign during office hours, so you can expect "fast" responses to your queries there. Outside of office hours, my response time may be slower as I may not see it immediately.

**Zoom:**

It is also required that you download and install Zoom. We will hold class using Zoom at the scheduled time but the class is designed so that we may not meet for the whole time since the material is available online and there will also be office hours. Office hours, should you wish a synchronous meeting to get help with the material or homework, will be conducted via Zoom meeting. By default, I will assume that you do not mind being in a meeting with other students if several want to meet at the same time. If you prefer a private one-on-one meeting, please let me know. Being on camera is not a requirement, but it is often helpful for you to show me what you've tried on a homework problem simply by holding it up to the camera for me to see.

**Office Hours:**

During office hours, I will be at my computer monitoring my email and WebAssign. If you wish to meet, please send me an email or a message through WebAssign and I will respond in short order with a Zoom meeting ID. If you wish to meet outside of the listed office hours, that can always be worked out as well, but with less immediacy. Just email me and we can work out a time.

Please note that I would strongly encourage you to ask any questions you have on the material in the Questions & Answers forum so that everyone can benefit from my responses to your questions!

**Homework & Exams:****Homework Information:**

There will be four homework assignments. Their due dates are listed below. It is my expectation that you work on this assignment daily as you work through the course. Do not wait until the last couple of hours trying to cram it all in. You will have 3 attempts for each question. Note that they are due at 11:59 PM. I've seen complaints about policies such as this, that they encourage students to stay up late while they try to cram it in last minute. You have 6-7 days to complete each assignment. It is entirely in your control whether that happens or not.

**Exam Information:**

Exams will be administered through WebAssign. The dates of the two exams (midterm and final) will not change. You will have 2.5 hours to complete each exam. You will be allowed a 24 hour window for each exam. That is, you

can start your exam any time between 12:00 AM and 9:30 PM on the designated day, but once started you have 2.5 hours to complete the exam. It cannot be paused and started again at a later time. Be sure to plan accordingly so that you have a 2.5 hour block of time where you can work on the exam uninterrupted. Exams will be “open note/open book” in that the textbook, any notes, any videos, and other materials I upload to WebAssign are available for you to refer to during the exam. You will have 2 attempts for each question. This is done to allow for the possibility of typos or to correct minor errors. Be sure to double-check your answer before you submit it!

#### Missed Exams:

If you are unable to complete your exam during the designated day, and you provide me with a valid excuse (such as a note from the doctor if you're sick, or proof that you were having technical difficulties with WebAssign, etc.), then we can reschedule your exam as soon as possible.

#### A special note regarding my policy for this course:

You are allowed to work together on homework. However, it should never be where answers are handed out from one student to another. The key here is to work together towards a common goal.

You are not allowed to work together on the exams.

#### **Illness and Death Notification:** (From pg. 16 of The Department of Mathematics and Statistics Department Handbook.)

The Center for Campus Life is responsible for notifying the campus community of student illnesses, immediate family deaths and/or student death. Generally, in cases of student illness or immediate family deaths, the notification to the appropriate campus community members occur when a student is absent from class for four (4) consecutive days with appropriate verification. It is always the student's responsibility for missed class assignments and/or course work during their absence. The student is encouraged to contact the faculty member immediately regarding the absences and to provide verification afterwards. The notification from the Center for Campus Life does not excuse a student from class, assignments, and/or any other course requirements. The notification is provided as a courtesy.

#### **Academic Integrity:** (From pg. 49 of the Texas Tech University Catalog.)

It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension.

“Scholastic dishonesty” includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act.

“Cheating” includes, but is not limited to, the following:

1. Copying from another student's test paper.
2. Using materials during a test that have not been authorized by the person giving the test.
3. Failing to comply with instructions given by the person administering the test.
4. Possessing materials during a test that are not authorized by the person giving the test, such as class notes or specifically designed “crib notes.” The presence of textbooks constitutes a violation only if they have been specifically prohibited by the person administering the test.
5. Using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program.
6. Collaborating with or seeking aid or receiving assistance from another student or individual during a test or in conjunction with an assignment without authority.
7. Discussing the contents of an examination with another student who will take the examination.
8. Divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructor has designated that the examination is not to be removed from the examination room or not to be returned to or kept by the student.

9. Substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course related assignment.
10. Paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program, or information about an unadministered test, test key, homework solution, or computer program.
11. Falsifying research data, laboratory reports, and/or other academic work offered for credit.
12. Taking, keeping, misplacing, or damaging the property of the university, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct.

“Plagiarism” includes, but is not limited to, the appropriation of, buying, receiving as a gift, or obtaining by any means material that is attributable in whole or in part to another source, including words, ideas, illustrations, structure, computer code, other expression and media, and presenting that material as one’s own academic work being offered for credit. Any student who fails to give credit for quotations or for an essentially identical expression of material taken from books, encyclopedias, magazines, Internet documents, reference works or from the themes, reports, or other writings of a fellow student is guilty of plagiarism.

“Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

“Falsifying academic records” includes, but is not limited to, altering or assisting in the altering of any official record of the university, and/or submitting false information or omitting requested information that is required for or related to any academic record of the university. Academic records include, but are not limited to, applications for admission, the awarding of a degree, grade reports, test papers, registration materials, grade change forms, and reporting forms used by the Office of the Registrar. A former student who engages in such conduct is subject to a bar against readmission, revocation of a degree, and withdrawal of a diploma.

“Misrepresenting facts” to the university or an agent of the university includes, but is not limited to, providing false grades or resumes; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual; or providing false or misleading information in an effort to injure another student academically or financially.

### **Civility and Communication Online:**

It is my hope and expectation that everyone conducts themselves in a civil and respectful manner in your communications with me and your fellow classmates online. When contacting me either through email or through WebAssign, please be clear and descriptive. Believe it or not, some professors have gotten more than a few emails from email addresses they don’t recognize, that are unsigned, have no subject, and say things like , “Yo, what’s the deal with problem 3 in the homework?”

**ADA Accommodation:** Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor’s office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or (806) 742-2405.

### Detailed Outline & Suggested Study Schedule:

Of course, you are free to review the material at your own pace, but I have attempted to outline a rough study schedule for you. Note that the material is more dense for the first couple of weeks of the course (but even still is only 2-3 sections per day). This is because Chapters 1 through 6 are more formulaic in nature, while Chapters 7 through 9 are more conceptual in nature and require more time to digest and develop the proper intuition to really understand them (in addition to learning to apply all the procedures and formulas).

My expectation is that you work through the slide shows provided in the Resources section of WebAssign while also following along in the textbook. The publisher-provided video lectures are also there for your reference, but they are very brief and, in my opinion, of limited benefit. Additionally, I have cultivated a list of videos from YouTube that cover some of the more important topics of the course.

Date	Material	Notes
July 7, Tuesday	1.1-1.2	
June 8, Wednesday	1.3-1.4	
June 9, Thursday	2.1-2.2	
June 10, Friday	2.4-2.5	
July 13, Monday	3.1-3.3	
July 14, Tuesday	3.4, 3.6	The Poisson process (pp. 134-135) is optional. You will not be tested on it.
July 15, Wednesday	4.1-4.2	<b>Homework 1 due, 11:59 PM – Chapters 1-3</b>
July 16, Thursday	4.3	
July 17, Friday	4.4-4.5	I want you to engage with this material, of course, but I really want you to focus on the “larger picture”. Get a feel for the distributions, their use, their pdfs, their means and variances, and where relevant, their history. But you will not be tested on the finer details of these distributions (e.g. the relationship between the exponential and Poisson).
July 20, Monday	5.3-5.4, 6.1	5.3: pp. 220-222 6.1: pp. 248-255 & 259 (standard error definition)
July 21, Tuesday	7.1-7.2	<b>Homework 2 due, 11:59 PM – Chapters 4-6</b> Be sure to pay special attention to the slides in 7.1 titled “Communicating a Confidence Interval”. The “Deriving a Confidence Interval” and “Bootstrap Confidence Intervals” subsections in 7.1 can be skipped.
<b>July 22, Wednesday</b>	<b>Midterm Exam (Ch. 1-6)</b>	
July 23, Thursday	7.3-7.4	The “A Prediction Interval for a Single Future Value”, “Tolerance Intervals”, and “Intervals Based on Nonnormal Population Distributions” can be skipped, but I have left them in the slide show for you to skim if you like. Please pay special attention to the discussion on robustness in 7.4.
July 24, Friday	8.1	Please spend a good deal of time on this section. The fundamental ideas behind a hypothesis test are vital! The proof on pg. 324 can be safely skipped.
July 27, Monday	8.2	
July 28, Tuesday	8.3	The subsections “ $\beta$ and Sample Size Determination” and “Variation in $P$ -values” can be (mostly) skipped. Refer to the slides (starting on slide 23) for guidance on sample size determinations.
July 29, Wednesday	8.4-8.5	<b>Homework 3 due, 11:59 PM – Chapters 7-8.3</b> Skip “Likelihood Ratio Principle” subsection in 8.5.

Date	Material	Notes
July 30, Thursday	9.1	Of course, all of Section 9.1 is important, but in practice, the assumption that the population variances are known is rarely (never) appropriate, so when large samples are available, the material from slide 50 on is relevant.
July 31, Friday	9.2	Skip “Type II Error Probabilities” subsection.
August 3, Monday	9.3	This material is often made much more complicated than it really is or needs to be. The key to this entire section is the last sentence on pg. 383 in the text (slide 13). Really and truly, you simply calculate the differences and treat it as a one-sample t-test/CI. And that’s all!
August 4, Tuesday	9.4	
August 5 Wednesday	9.5	<b>Homework 4 due, 11:59 PM – Chapters 8.4-9</b>
<b>August 6 Thursday</b>	<b>Final Exam (Ch. 7-9)</b>	

Special notes for specific (optional) sections:

- The material in 2.3 is tested in the FE exam but is not required in this course. Slides have been provided for this section for your reference if you wish to review the material.
- Probability plots are explained in 4.6. I’m not interested in you knowing the nitty-gritty details of how probability plots are constructed. However, as they are used to evaluate whether or not data appear (approximately) normal, and because that’s important to us, the salient details that I want you to know is that data from a (approximately) normal population will fall roughly in a straight line on a probability plot.

## **Additional Information**

Last, but certainly not least, here is some additional information and advice for succeeding in this course.

### Calculus

This is a calculus-based course. You are expected to know and to be able to apply all that you've learned in your calculus courses. That said, the types of operations that we will make the most use of are derivatives and definite integrals. In particular, you should definitely know how to take derivatives and integrate functions that involve polynomials,  $e^{f(x)}$ ,  $\ln(f(x))$ , and basic trig functions (sine and cosine), where  $f(x)$  represents some continuous function (generally of the type listed already).

### Technology

Of course you are allowed the use of a calculator for this course. And there exist many calculators that can automate many of the things that you will be doing, such as calculating basic statistics (mean, variance, etc.) or even performing one- and two-sample hypothesis tests and confidence intervals. Please, learn how to use it to perform these operations! It is not required, but it is highly encouraged.

Additionally, you are allowed to use resources such as WolframAlpha to help with your calculus.

You will find, however, that providing proper inputs to your calculator/WolframAlpha will be the hardest part of the problem! If you can't set up the integral properly that you ask WolframAlpha to solve, then you have no chance of getting the correct solution.

### Online Learning

If you have little experience with online classes, then you may find this setting to be challenging. This course is offered in an asynchronous setting (i.e. not real-time). You are free to learn and work the homework at your own pace (subject to the natural deadlines imposed by the exams). At your disposal, you have the textbook, a slideshow for each section, numerous videos, forums to ask questions, my email, Zoom meetings with me, and last (but certainly not least) the entire internet at your disposal to help you learn and master this material.

But all of these resources are useless if you do not devote sufficient uninterrupted time to learning. This requires discipline, planning, and forethought. You are accountable to only yourself. I could easily double the length of this already lengthy syllabus providing my thoughts and advice for how to succeed in an online setting, but instead I searched Google for "succeeding in an online class", and this was near the top of the results. Please read through it (and others like it) as they offer some good advice: <https://goodcolleges.online/study-tips-for-success/>.

One thing in particular I wanted to point out, however, is the importance of taking notes. Even though the material is already written down in the slideshows and textbook, write it down yourself, in your own handwriting and in your own words. Don't just glance over the example problems and nod and think to yourself "yeah that makes sense". Actually work through the problems yourself so that you get a deeper understanding of each step. There have been numerous studies that demonstrate the benefits of writing out notes by hand (e.g. <https://www.medicaldaily.com/why-using-pen-and-paper-not-laptops-boosts-memory-writing-notes-helps-recall-concepts-ability-268770>).