

**LAMAR UNIVERSITY**  
**College of Arts and Sciences**  
**Department of Mathematics**  
**SYLLABUS**  
**FALL 2017**

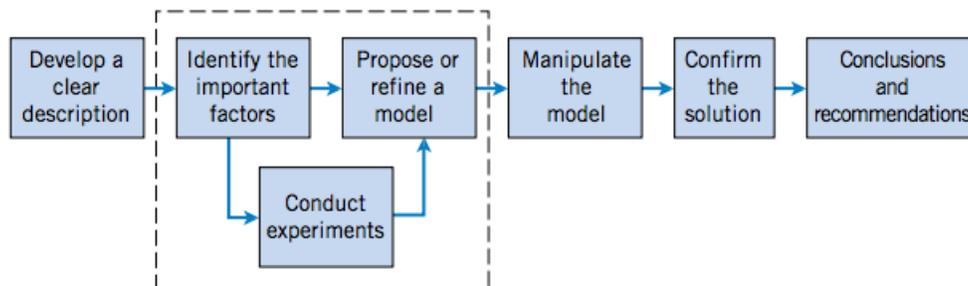
**Course Number** MATH 3370/ 04  
**Course Title** Intro Theory Statistical Inference  
**Credit Hours** 3  
**Prerequisites** Grade of C or better in MATH 2414 or its equivalent.  
**Place/Time** Lucas 114 TR 3:50 pm - 5:10 pm

**Instructor** Dr. Jasdeep Pannu  
**Office** Lucas 200 G  
**Email** jpannu@lamar.edu  
**Office Hours** TR 1:30 pm - 3:30 pm and by appointment

**GENERAL COURSE INFORMATION**

**Catalog Description** A calculus-based introduction to statistics, probability, special probability distributions, nature of statistical methods, sampling theory, estimation, testing hypotheses.

**Importance of Course** An engineer is someone who solves problems of interest to society by the efficient application of scientific principles. Engineers accomplish this by either refining an existing product or process or by designing a new product or process that meets customers' needs. The engineering, or scientific, method is the approach to formulating and solving these problems. The steps in the engineering method are shown below:



Notice that the engineering method features a strong interplay between the problem, the factors that may influence its solution, a model of the phenomenon, and experimentation to verify the adequacy of the model and the proposed solution to the problem. Steps 2-4 in the figure above are enclosed in a box, indicating that several cycles or iterations of these steps may be required to obtain the final solution. Consequently, engineers must know how to efficiently plan experiments, collect data, analyze and interpret the data, and understand how the observed data are related to the model they

have proposed for the problem under study. The field of [statistics](#) deals with the collection, presentation, analysis, and use of data to make decisions, solve problems, and design products and processes. Because many aspects of engineering practice involve working with data, obviously some knowledge of statistics is important to any engineer. Specifically, statistical techniques can be a powerful aid in designing new products and systems, improving existing designs, and designing, developing, and improving production processes.

**Learning Outcomes** Upon completion of the course, the student will be able to:

- Define a sample space for an experiment;
- Compute the probability of an event;
- Apply the laws of probability to calculate the probability of a compound event;
- Distinguish between an independent and dependent event;
- Illustrate the concept of discrete and continuous random variables;
- Distinguish between the pmf of a discrete random variable and the pdf of a continuous random variable;
- Describe some special named distributions;
- Describe a transformation of a random variable;
- Give an example of a random sample and the sampling distribution of sample mean.
- Define statistic and describe its distribution;
- State the Central Limit Theorem;
- Identify conditions under which a binomial or a Poisson distribution could be approximated by a normal distribution;
- Describe the point estimation and interval estimation for a population mean;
- Describe the theory for hypothesis testing.

**Text** Probability & Statistics for Engineering and the Sciences, Devore, 9th ed.  
It is NOT required to buy the textbook.

**Required Material** 1) You need a **basic calculator** for the exams. You may **NOT** use your cell phone or any other communication device as a calculator during exams.  
2) A Statistical Software **R** will be used.

**Lectures/Discussions** The course lectures are designed to introduce statistical concepts, objects and techniques. We will discuss these ideas and work through examples to understand their meaning, relationships, and continue our development. The application of statistics takes coordination, similar to playing sports or musical instruments. To achieve the coordination that makes playing look easy takes practice. One of our goals in the classroom is to help get you started. A tool we use in this course to do this is called ACTIVE LEARNING. We actively work problems in class, make mistakes, and learn from them. However, practice outside of class is necessary and required. Otherwise we will not reach the level of understanding and proficiency necessary to retain, employ and develop our tools. The course topics that we cover can be found on the attached list at the end of the syllabus.

## HOMEWORK, EXAMS & PROJECT

**Homework** There will be homework on each Chapter. Students will give presentations based on the HW assignments. Everybody **must** present some of their work during the semester; other wise, you **forfeit** that portion of your grade. All exams will be based on the homework problems. You are expected to complete the assigned homework and be familiar with the material covered.

**Exams** There will be **two** in-class exams and a Final Exam.

**Project** You will work one a statistical project in groups of **2** for which you will analyze a data using the statistical techniques and software **R** that you learnt in this course. You will give an in-class presentation of **5** mins on your project. You will also write a project report (min 4 pages) which will be due on the day you present your project.

**In-Class Participation** In this course, I will introduce various topics of study, and we will discuss them. Then, you will explore them and practice working on them in more depth in the form of **work sheets** outside and inside of class. A significant portion of our class time will be devoted to student presentations of this practice, so that we may learn from and better understand your thinking, collectively moving toward more effective methods of solving problems. Student presentations are an important part of our learning process in mathematics, and dedicated preparation in your assignments is essential to your success. Everybody must participate in class participation by showing their work during the semester; otherwise, you forfeit that portion of your grade.

## GRADING POLICY

Your course grade will be determined as below:

- Exam 1 - 20%
- Exam 2 - 20%
- Final Exam - 25%
- HW Presentation/ In-Class Participation - 25%
- Project - 10%

Course grades are guided by the table below.

59% or less	60% - 69%	70% - 79%	80% - 89%	90% - 100%
F	D	C	B	A

## EXAM DATES

**NOTE:** These are the tentative dates for Exams 1 and 2. But the rest of the dates are fixed.

Exam 1	Exam 2	Final Exam	Project Presentations (5 mins each)	Project Presentations (5 mins each)
Thursday September 28	Thursday November 2	Tuesday December 12 3:50 pm - 5:10 pm	Thursday November 30	Tuesday December 5

## ATTENDANCE/ CLASS PARTICIPATION POLICY

- According to Lamar University policy, students are expected to attend all scheduled classes.
- **UNEXCUSED** absences will result in a grade of 0 for class participation.
- Class participation points will be awarded at the end of the semester towards your final grade.
- Attendance and class participation will be recorded daily.
- **YOU will be responsible for all class material, announcements and functions such as exam date changes. The same rule still holds in case you must miss a class for any reason.**
- Class participation cannot be made up.
- Excuse notes for absence will only be accepted within a **3** day period of the missed class and **NOT** at the end of the semester.

## ABSENCE FROM EXAMS

- **No make-up** exam will be given unless there are extraordinary circumstances.
- You have to notify me as soon as possible in the event of missing an exam.
- **Un-excused absences will result in a score of 0.** There will be NO exceptions to this policy.

## REFLECTION & READING AHEAD

I highly recommend you to read the material ahead of time, **BEFORE** the class and go over the class material covered in the class **AFTER** each class, so that you can follow the lectures better and ask questions.

## EXPECTATION

I expect that everyone will maintain a classroom conducive to learning. I like an informal atmosphere, but it must be orderly. Thus, everyone is expected to behave with basic politeness, civility, and respect for others. Private communications are **NOT** allowed. Neither are reading extraneous materials, using electronic equipment (unless otherwise indicated), or **SLEEPING**.

## SPECIAL NOTES

- I reserve the right to decide the border line cases.
- Cell phones or any other instant messaging devices are not to be used in this class. The use of cell phones during a test may be construed as an Academic Honesty violation.

## CHANGES

While I have made sincere efforts to ensure that this syllabus is correct, changes may be required. Any substantive changes will be announced during a regularly scheduled class. If you find an error or omission, please advise me at once so that the other members of the class may be notified.

*Lamar University*  
*Department of Mathematics*  
*Important Information for Students*

Lamar University expressly prohibits intimidation and harassment of students, faculty, staff, or applicants. <http://students.lamar.edu/academic-support/code-of-conduct.html>

**Drop Policy:** Please make note of the three dates indicated in this drop policy. Any drop will be your responsibility; I will not drop a student from the course.

**September 19, 2017:** (Census Date-Six Drop Rule does not apply) A student may drop or withdraw without consulting with the instructor. The Six Drop Rule does not apply to a drop before 5:00 PM.

**October 2, 2017:** (Six Drop Rule applies) A student may drop or withdraw from the course without academic penalty and receive a Q, however, the Six Drop Rule applies. The student will consult with the instructor and the Records Office to initiate a drop.

**November 6, 2017:** (Six Drop Rule applies) Last day to drop or withdraw with academic penalty; the student must be passing the course at the time of the requested drop in order to receive a Q. The drop form, including all required signatures, must arrive in the Records Office by no later than 4:00 PM. No drop is allowed after this date except in extreme extenuating circumstances. Any “late drop” must be approved by the instructor, department chair, college dean, and provost.

**Academic Integrity:** Students are expected to maintain complete honesty and integrity in their academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. Students are specifically warned against all forms of cheating and plagiarism. The *Lamar University Student Handbook* clearly reads: “Any student found guilty of academic dishonesty in any phase of academic work will be subjected to disciplinary action. Punishable offenses include, but are not limited to, cheating on an examination or academic work which is to be submitted, plagiarism, collusion, and the abuse of source materials.” One aspect of the *Handbook’s* definition of cheating includes “purchasing or otherwise acquiring and submitting as one’s own work any research paper or other writing assignment prepared by an individual or firm.” Plagiarism is defined as “the appropriation and the unacknowledged incorporation of another’s work or ideas into one’s own and submitted for credit.” Faculty members in the College of arts and Sciences investigate all cases of suspected plagiarism. Any student who is found cheating in this course will receive a course grade of F. <http://students.lamar.edu/student-handbook.html>

**Accommodations through the Disability Resource Center:** Lamar University is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is located in the Communications building room 105. Office staff collaborate with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact the DRC at [409-880-8347](tel:409-880-8347) or [drc@lamar.edu](mailto:drc@lamar.edu) to arrange a confidential appointment with the Director of the DRC to explore possible options regarding equitable access and reasonable accommodations. If you are registered with DRC and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course.

<http://www.lamar.edu/disability-resource-center/>

**Incomplete Grades:** The grade of "I" may be given when any requirement of the course, including the final examination, is not completed. Arrangements to complete deficiencies in a course should be made with the instructor prior to the end of the semester or term. Incomplete work must be finished during the next long semester or the Records Office will change the "I" to the grade of "F." While the extension may be granted by the instructor with the approval of his/her Department Chair and Academic Dean, once the "I" is changed to an "F" it cannot be changed back to an "I." In this case, either a "change of grade" procedure must be initiated or the course must then be repeated if credit is desired. The instructor may record the grade of "F" for a student who is absent from the final examinations and is not passing the course.

**Campus Closure:** In the event of an announced campus closure in excess of four days due to a hurricane or other disaster, students are expected to login to Lamar University's website's homepage for instructions about continuing courses remotely. <http://lamar.edu>

**Emergency Procedures:** Many types of emergencies can occur on campus; instructions for severe weather or violence/active shooter, fire, or chemical release can be found at: <http://www.lamar.edu/about-lu/administration/risk-management/index.html>

Following are procedures for the first two:

**Severe Weather:**

- Follow the directions of the instructor or emergency personnel.
- Seek shelter in an interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside.
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building.
- Stay in the center of the room, away from exterior walls, windows, and doors.

**Violence/Active Shooter:**

- **CALL** - 8-3-1-1 from a campus phone (880-8311 from a cell phone). Note: Calling 9-1-1 from either a campus phone or cell phone will contact Beaumont City Police Dispatch rather than University Police.
- **AVOID**- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- **DENY**- Barricade the door with desks, chairs, bookcases or any other items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.
- **DEFEND**- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

**Course Evaluations:** You will have an opportunity to evaluate all aspects of this course in a formal process to be completed online near the end of the term. You will receive an email reminder through your LU account.

# Lamar University

## Department of Mathematics

### **MATH 3370: Introduction to the Theory of Statistical Inference (3 hour course)**

Textbook: Probability & Statistics for Engineering and the Sciences (9<sup>th</sup> edition) by Jay L. Devore

<u>Section</u>	<u>Topic</u>	<u>Page/Problems</u>
1.1	Populations, Samples, and Processes	12/1,3,4
1.3	Measures of Location	34/33,38,41,42
1.4	Measures of Variability	44/44,45,47
2.1	Sample Spaces and Events	56/1,3,4,5
2.2	Axioms, Interpretations, and Properties of Probability	64/11,14,16,18,21
2.3	Counting Techniques	73/29,31,33,37,39
2.4	Conditional Probability	82/45,47,49,51
2.5	Independence	89/70,71,77,78,79
3.1	Random Variables (R.V.)	98/1,4,6,7a,c,e,g
3.2	Probability Distributions for Discrete R.V.	107/11,13,14,17,18,19
3.3	Expected Values	116/29,30,34,38,39
3.4	The Binomial Probability Distribution	123/47a,c,e,g,49,53,55,57
3.5	Hypergeometric and Negative Binomial Distributions	130/68,69,71,72
3.6	The Poisson Probability Distribution	135/79,81,83,85
4.1	Probability Density Functions	146/1,3,5,7
4.2	Cumulative Distribution Functions and Expected Values	154/11,13,14
4.3	The Normal Distribution	167/28a,c,e,g,i,29,35,37,39,43
4.4*	The Exponential and Gamma Distributions	175/59,61,67
5.1	Jointly Distributed R.V.	210/1,5,9
5.2	Expected Values, Covariance, and Correlation	219/22,25
5.3	Statistics and Their Distributions	229/37,39,41
5.4	The Distribution of the Sample Mean	236/46,47,49,53
5.5	The Distribution of a Linear Combination	241/58,59,60,65
6.1	Some General Concepts of Point Estimation	261/1,2,3
6.2	Methods of Point Estimation	273/20,23,25
7.1	Basic Properties of Confidence Intervals (C.I.)	284/1a,c,3,5
7.2	Large-Sample C.I. for a Population Mean and Proportion	292/13,15a,c,17,21,23
7.3	Intervals Based on a Normal Population Distribution	302/28a,c,29a,c,e,33,37
7.4*	C.I. for the Variance and Standard Deviation of a Normal Population	306/42a,c,e,43a,c,45,47
8.1	Hypotheses and Test Procedures	325/1a,c,e,2a,c,e,g,3,5,7,9a,c,e,11a,c,e
8.2	z-Tests About a Population Mean	333/15,17,19,20
8.3	The One-Sample <i>t</i> -Test	344/29a,c,31a,c,37
8.4	Tests Concerning a Population Proportion	350/42a,c,,43,45
9.1	z-Test and C.I. for a Difference between Two Means	371/1,8
9.2	The Two-Sample <i>t</i> -Test and C.I.	379/17a,c,19,23,29

• = optional

Revised: 06/20/2015, P.C.