Math 383: Mathematical Probability and Statistics (3.0 units)

Spring 2018

T & TH 1:30- 2:45 RLC 108

Instructor: Dr. Catherine Crockett

email: catherinecrockett@pointloma.edu

office phone: 619-849-2723

Office Rohr Science, Room 226

Office hours: MWF 11-12, T TH 3-4, M 2-4, T 9-9:45 at Liberty Station, F 2:30-3:30 or by appointment

Text: *Modern Mathematical Statistics with Applications* , Jay L. Devore and Kenneth N. Berk

Other materials for the course: A scientific calculator is recommended.

Important Dates:	**Exam #1: Thursday, February 15**
	Exam #2: Thursday, April 5
	Final Exam: Tuesday, May 1, 1:30- 4

PLNU Mission

To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission

The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Course Description:

A first course in probability and statistics for students with sophisticated mathematics exposure. Topics include axioms of probability, random variables, discrete and continuous distributions, mathematical expectation, limit theorems, least square estimates of parameter, linear regression, experimental design, hypothesis testing, and confidence of intervals, testing of models, data analysis and appropriateness of models. Topics are supported by the use of statistical software.
Prerequisite: Mathematics 274

Learning Outcomes:

Students will be able to apply their mathematical knowledge to solve problems.

Students will be able to use technology to solve problems.

Students will collaborate effectively in teams.

Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats.

Assessment and Grading:

Grades for the course will be based on the following (percentage of the course grade):

  Homework (25%),

  Labs (10%)

  Exams (15% each for a total of 30%)

  Final exam (35%)

Grading Scale: Approximate minimal percentages required to obtain a given grade are:

Grades in percentages

	A	B	C	D	F
+		[87.5,90)	[77.5, 80)	[67.5, 70)	[0,60)
	[92.5,100]	[82.5,87.5)	[72.5, 77.5)	[62.5,67.5)	
-	[90, 92.5)	[80, 82.5)	[70, 72.5)	[60, 62.5)	

  *You will be able to view your grades in CANVAS.

Homework (25%): Homework will be assigned every class meeting. All homework assigned in a week will be due **at the start of class** the next Thursday. No late homework will be accepted except by prior arrangement or with a documented emergency. The object of the homework is to learn how to do the problems so I expect to see calculations on your homework using the terminology and methods of the class and not just an answer. Homework will be scored on a combination of completeness (with work shown) and correctness. A random selection (the same

for all people) of the problems will be graded on any homework assignment. The two lowest homework scores will be dropped.

Groups: There is almost a century of research showing that academic achievement, productivity, and self- esteem improve dramatically when students work together in groups. This method emphasizes teamwork, cooperation and support by others, rather than isolation and competition in learning.

You will be randomly assigned to a group on a four to eight-week basis. Certain homework problems will be assigned to each group. If selected, your group will present their assigned problems to the class. Absence or obvious lack of participation will lower your semester homework grade by up to 10% per week.

Labs (10%): Labs will be assigned during the week and it will be collected the following week. A lab is late if it is not received by the due date. No late labs will be accepted.

Exams (15% each): There are two exams for this course. If you do not take an exam you will receive a zero for it. A late exam may be taken only by _prior arrangement with me_ or a well documented emergency beyond your control. The examination schedule is included in the daily schedule. I do not intend to accept excuses such as poor communication with parents, benefactors, sport team sponsors and/or travel agents.

Final Exam (35%): The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor.

Side Note: Turn off any cell phone, pager or things that make noise while you are in class. Also, do not text or work on other classes while in class -to do so is disrespectful to your classmates and me. You may be asked to leave the class for such behavior, resulting in an absence.

General Advice:

You learn mathematics by doing it yourself. You should expect to spend approximately two hours outside of class for every one hour in class working on homework and going over concepts. When doing homework, please note it is normal to not be able to do every problem correct on the first attempt. Do not be discouraged, instead seek help.

University Policies:

FINAL EXAMINATION POLICY

The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic <u>dis</u>honesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See [Disability Resource Center](#) for additional information. Students with learning disabilities who may need accommodations should discuss options with the instructor during the <u>first two weeks</u> of class.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day.

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation.
See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class_Attendance in the Undergraduate Academic Catalog.

Class Enrollment:

It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Credit Hour:

In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 3 unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Course Schedule:

Please note this schedule is tentative. Any changes will be announced.

Week	Tuesday	Thursday
1 1/8- 1/12	1/9 No class	1/11 Introduction 1.1: Populations and Samples 1.2: Pictorial & Tabular Methods in Descriptive Statistics
2 1/15- 1/19	1/16 1.3: Measures of Location 1.4: Measures of Variability	1/18 2.1: Sample spaces and events 2.2: Axioms, Interpretations and properties of probability
3 1/22- 1/26	1/23 2.3: Counting Techniques 2.4: Conditional Probability	1/25 2.5: Independence 3.1: Random Variables
4 1/29- 2/2	1/30 3.2: Probability Distributions for Discrete Random Variables 3.3: Expected Values of Discrete Random Variables	2/1 3.4: Moments and Moment Generating Functions 3.5: The Binomial Probability Distribution
5 2/5-2/9	2/6 3.6: Hypergeometric and Negative Binomial Distributions 3.7: The Poisson Probability Distribution	2/8 4.1: Probability Density Functions and Cumulative Distribution Functions 4.2: Expected Values and Moment generating Functions.
6 2/12- 2/16	2/13 4.1: Probability Density Functions and Cumulative Distribution Functions 4.2: Expected Values and Moment generating Functions.	2/15 4.3: Normal Distribution 4.4: The Gamma Distribution and Its Relatives **Exam #1** **(Chapters 1, 2 & 3)**
7 2/19- 2/23	2/20 4.5: Other Continuous Distributions 4.6: Probability Plots	2/22 4.7: Transformations of a Random Variable 5.1: Jointly Distributed Random Variables
8 2/26- 3/2	2/27 5.2: Expected Values, Covariance, and Correlation 5.3: Conditional Distributions	3/1 5.4: Transformations of Random Variables 6.1: Statistics and Their Distributions
	Spring Break 3/5 to 3/9	
9 3/12- 3/16	3/13 6.2: The Distribution of the Sample Mean 6.3: The Mean, Variances and MGF for Several Variables	3/15 6.4: Distributions Based on a Normal Random Samples
10 3/19- 3/23	3/20 7.1: General Concepts and Criteria 7.2: Methods of Point Estimation	3/22 8.1: Basic Properties of Confidence Intervals 8.2: Large-Sample Confidence Intervals for a Population Mean and

		Proportion

11
3/26-
3/30
	3/27
	  8.3: Intervals Based on a Normal Population Distribution
	  9.1: Hypotheses and Test Procedures
		3/29
		Easter Break
		No Class

12 4/2-4/6	4/3 9.2: Tests About Population Mean 9.3: Tests Concerning Population Proportion 9.4: P-Values	4/5 9.5: Some Comments **Exam #2 (Chapters 4-9)**
13 4/9- 4/13	4/10 10.1: z Tests and Confidence Intervals for a difference Between Two Population Means. 10.2: The Two Sample t Test and Confidence Interval	4/12 10.3: Analysis of Paired Data 10.4: Inference about Two Population Proportions
14 4/16- 4/20	4/17 11.1: Single-Factor ANOVA 11.2: Multiple Comparisons in ANOVA	4/19 12.1: The Simple linear and Logistic Models 12.2: Estimating Model Parameter
15 4/23- 4/27	4/24 12.3: Inference about regression coefficient	4/26 12.5: Correlation
16 Finals Week	**5/1** **Final Exam: 1:30 to 4**	5/3