Syllabus

To-Do Date: Feb 28 at 11:59pm

19 02 POINT LOMA NAZARENE UNIVERSITY	**Mathematics, Information and Computer Sciences Department** **MTH 3083: Mathematical Probability and Statistics** **3.0 Units**
Spring 2021 MWF 11:00 to 11:55 am	

Instructor: Catherine Crockett, Ph.D.
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Office hours: By Appointment in Zoom. Please email me with time and day.

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 is an expression of faith. Being of Wesleyan heritage, we strive 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 2074 or equivalent

COURSE 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.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

Devore, Jay L and Kenneeth N. Berk. *Modern Mathematical Statistics with Application, 2nd Ed.* Springer, 2012

COURSE CREDIT HOUR INFORMATION

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 requirement can be provided upon request. (Based on 37.5 hours of student engagement per credit hour.)

Distribution of Student Learning Hours

Category	Time Expectation in Hours
Participation in class	28
Reading & Notes	36

Category	Time Expectation in Hours
Homework	31
Labs	14
Exams	2
Final Exam	2.5
Total Hours	113.5

ASSESSMENT AND GRADING

Graded Components

- **Labs:** The labs are due at the scheduled dates and times, and are submitted ONLY in Word, Excel, or .pdf format in Canvas (e.g. Google Docs and Apple Numbers are not permitted).
- **Homework**: Homework will be assigned every class meeting. All homework assigned in a week will be due on the following 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.
- **Notes and Videos**: Each section will have reading and/ or videos to watch and you should take notes. Your notes will be submitted in a weekly Canvas Discussion to provide evidence you are keeping up.
- **Examinations and the Final Examination**. Examinations and the Final Examination will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class. No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control. 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.
- **Late work will not be accepted** without prior consent or a well-documented emergency. Up to a maximum of one homework assignment will be accepted up to 3 days late provided that consent is received from the professor before it is due. Homework assignments that are submitted late without prior consent will be recorded with a score of zero. If more than half of the homework

assignments are submitted on time, then the lowest homework score will be dropped from the calculations of the homework grade.

- The examination schedule is included in the daily schedule. This instructor does not intend to accept excuses such as poor communication with parents, benefactors, surf team sponsors and/or travel agents.

Grading Distribution	**Percent**
Two Examinations at 15 % each	30
Final Exam	35
Labs	10
Homework	20
Reading & Videos Notes	3
Participation in class	2
Total	100

Grading Scale

Grades are based on the number of points accumulated throughout the course with the following exception. A student must pass at least one of Exam 1, Exam 2, or the Final Exam in order to pass the class. That is, a score of 60% must be achieved on one of the Exams, or else the final grade will be an F regardless of all other point totals. Approximate minimal percentages required to obtain a given grade are:

Standard Grade Scale Based on Percentages					
	A	**B**	**C**	**D**	**F**
+		87.5- 90	77.5-80	67.5-70	
	92.5 -100	82.5-87.5	72.5-77.5	62.5 -67.5	0-60

Standard Grade Scale Based on Percentages					
	A	**B**	**C**	**D**	**F**
_	90-92.5	80-82.5	70-72.5	60-62.5	

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on **State Authorization (https://www.pointloma.edu/offices/office-institutional-effectiveness-research/disclosures)** to view which states allow online (distance education) outside of California.

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

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.

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 dishonesty 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** (http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278) for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (**DRC@pointloma.edu** (https://mail.google.com/mail/?view=cm&fs=1&tf=1&to=DRC@pointloma.edu) or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU ATTENDANCE AND PARTICIPATION POLICY

For remote students:

Students taking online courses are expected to attend each week of the course. Attendance is defined as participating in an academic activity within the online classroom which includes posting in a graded activity in the course. (Note: Logging into the course does not qualify as participation and will not be counted as meeting the attendance requirement.)

Students who do not attend at least once in any 3 consecutive days will be issued an attendance warning. Students who do not attend at least once in any 7 consecutive days will be dropped from the course retroactive to the last date of recorded attendance.

When we can go face-to-face:

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 **Academic Policies (http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278)** for further information about class attendance.

SPIRITUAL CARE

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the **Office of Spiritual Development (https://www.pointloma.edu/offices/spiritual-development)**

week	Monday	Tuesday: Due	Wednesday- **class**	Thursday: Due	Friday- **class**
1 3/1- 3/5	First day of class: Introduction to course & Chapter 1	Notes for Chapter 1	1.1: Populations and Samples 1.2: Pictorial & Tabular Methods in Descriptive Statistics 1.3: Measures of Location 1.4: Measures of Variability	Notes 2.1-2.3	2.1: Sample spaces and events 2.2: Axioms, Interpretations and properties of probability 2.3: Counting Techniques
2 3/8- 3/12	Optional Lab	Notes: 2.4-2.5 Lab #1	2.4: Conditional Probability 2.5: Independence	Notes 3.1-3.3 HW #1	3.1: Random Variables 3.2: Probability Distributions for Discrete Random Variables 3.3: Expected Values of Discrete Random Variables
3 3/15- 3/19	Optional Lab	Notes 3.4-3.5 Lab #2	3.4: Moments and Moment Generating Functions 3.5: The Binomial Probability Distribution	Notes 3.6-3.7 HW #2	3.6: Hypergeometric and Negative Binomial Distributions 3.7: The Poisson Probability Distribution
4 3/22- 3/26	Optional Lab	Notes 4.1 -4.2 Lab #3	4.1: Probability Density Functions and CDF 4.2: Expected Values and MGF	Notes: 4.3-4.4 HW #3	4.3: Normal Distribution 4.4: The Gama Distributions and Its Relatives
5 3/29- 4/2	Class (since no class on Wednesday) 4.6: Probability Plots	Lab #4	No Class on Wednesday • Meet on Monday instead	Notes 4.7 HW #4	4.7: Transformations of a Random Variable **Review**
6 4/5- 4/9	**Exam #1**	Note: 5.1- 5.2	5.1: Jointly Distributed Random Variables 5.2: Expected Values, Covariance, and Correlation	Notes: 5.3-5.4 HW #5	5.3: Conditional Distributions 5.4: Transformations of Random Variables
7 4/12- 4/16	Optional Lab	Note: 5.5 Lab #5	5.5: Order Statistics	Note: 6.1 HW #6	6.1: Statistics and Their Distributions

8 4/19- 4/23	Optional Lab	Note: 6.2	6.2: The Distribution of the Sample Mean	Note: 6.3 HW #7	6.3: The Mean, Variance, and MGF for Several variables
9 4/26- 4/30	Optional Lab	Note: 6.4 Lab #6	6.4: Distributions Based on a Normal Random Samples	Note: 7.1, 7.2 HW#8	7.1:General Concepts and Criteria 7.2: Methods of Point Estimation
10 5/3- 5/7	Class meets 8.1: Basic Properties of Confidence Intervals	Lab #7	No class on Wednesday	Note: 8.2, 8.3 HW#9	8.2: Large-Sample Confidence Intervals for a Population Mean and Proportion 8.3: Intervals Based on a Normal Population Distribution
11 5/10 – 5/14	Optional Lab	Notes: 9.1, 9.2 Lab #8	9.1: Hypotheses and Test Procedures 9.2: Tests About Population Mean	Notes: 9.3 HW#10	9.3: Tests Concerning Population Proportion
12 5/17 – 5/ 21	Optional Lab	Note: 9.4,9.5 Lab #9	9.4: P-Values 9.5: Some comments on selecting a Test Procedure	HW#11	Review
13 5/24 – 5/28	**Exam #2**	Notes: 10.1, 10.2	10.1: z Tests and Confidence Intervals for a difference Between Two Population Means. 10.2: The Two Sample t Test and Confidence Interval	Notes: 10.3, 10.4 HW#12	10.3: Analysis of Paired Data 10.4: Inference about Two Population Proportions
14 5/31- 6/4	Optional Lab	Notes: 11.1, 11.2 Lab #10	11.1: Single-Factor ANOVA 11.2: Multiple Comparisons in ANOVA	Notes: Chapter 12 HW#13	Chapter 12
Finals week 6/7- 6/11				**HW #14**	**Final Exam 1:30 to 4**