

Syllabus

 <p>POINT LOMA NAZARENE UNIVERSITY</p>	<p>Department of Mathematical, Information and Computer Sciences</p> <p>MTH 4053—Advanced Applied Statistics</p> <p>3 Units TR 8:00-9:45, Rohr Science 395</p>
<p>Fall 2022 August 30 - December 16</p>	

<p>Instructor: Greg Crow</p>
<p>Phone: 619.849.2604</p>
<p>Email: gcrow@pointloma.edu</p>
<p>Office hours: Posted in Canvas</p>

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

This course is a continuation of MTH 3083 including the topics of random sampling and experimental design, sampling distributions, methods of estimation and the properties of estimators, least square estimates of parameter, linear regression, hypothesis testing, and confidence intervals, testing of models, data analysis and appropriateness of models. Topics are supported by the use of statistical software.

Prerequisite: MTH 3083

COURSE LEARNING OUTCOMES

1. Students will be able to apply their mathematical knowledge to solve problems.
2. Students will be able to use technology to solve problems.
3. 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.

COURSE PHILOSOPHY

Mathematics requires active participation. Participation means asking questions, making conjectures and checking them, providing solutions to problems, sharing ideas with classmates. During class time I will participate in the same way.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

Foundations and Applications of Statistics: An Introduction Using R, by Randall Pruim (ISBN: 978-1470428488)

Modern Mathematical Statistics with Applications, by Jay L. Devore, Kenneth N. Berk, and Matthew A. Carlton (ISBN: 978-3030551551)
(Recommended)

ASSESSMENT AND GRADING

Graded Components

Homework: Homework problems will be assigned regularly and posted on Canvas. A homework assignment is late if it is not submitted at the beginning of class on the due date. Please check regularly to ensure that you are keeping up with the homework. Late homework will not be accepted without prior approval. Your lowest homework score will be dropped.

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.

Late Written Homework 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.

Late Portfolios or Late Presentations: The student will make a presentation and submit a both a draft portfolio and a final portfolio of projects completed during the semester to their peers in the class and a group of department faculty members. The draft portfolio is due at 12:00 noon on Thursday 20-Oct-2022, and the Final Portfolio is due at 12:00 noon on Friday 2-Dec-2022. The presentation will be given during the Final Exam period on 13-Dec-2022. If either of the portfolios or the presentation is late, the maximum score for the final class grade will be reduced by $10\% * 2(n-1)$ where n is the sum of the number of 24-hour days (or portions thereof) that any of them is late. A grade of A, B, C, D, or F will be assigned based on the statistical depth, difficulty, and clarity, as well as the quality of the communication (both written and oral) of the presentation and the portfolio.

Grading Distribution	Percent
Mid-Semester Draft Portfolio	20
Final Portfolio	35
Final Presentation	15
Two Examinations (at 12.5% Each)	25
Written Homework	5
Total	100

FINAL EXAM:

Date and Time: Tuesday, 13-Dec-2022 from 7:30-10:00am

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.

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 Examination 1, Examination 2, or the Final Examination in order to pass the class. That is, a score of 60% must be achieved on one of the Examinations, 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- 90.0)	(77.5-80.0)	(67.5-70.0)	
	[92.5 -100.0]	[82.5-87.5]	[72.5-77.5]	[62.5 -67.5]	[0-60]
-	[90.0-92.5)	[80.0-82.5)	[70.0-72.5)	[60.0-62.5)	

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 \(https://www.pointloma.edu/offices/office-institutional-effectiveness-research/disclosures\)](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.

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 fifteen 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.)

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 \(http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278\)](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

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu (<mailto:EAC@pointloma.edu>) or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course. Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

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 [Academic Policies \(http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278#Class Attendance\)](http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278#Class_Attendance) 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 \(https://www.pointloma.edu/offices/spiritual-development\)](https://www.pointloma.edu/offices/spiritual-development)

	Week	Tuesday	Thursday
September	1	30 (Monday Schedule)	1 Introduction D&B 10.4: Inferences About Two Population Proportions
	2	6 D&B 10.5: Inferences About Two Population Variances	8 Statistical Laboratories in R and Selecting Data Sources
	3	13 D&B 4.6: Percentile Matching D&B 8.5: Bootstrap Confidence Intervals	15 Data Project Consultations
	4	20 D&B 11.1 Single Factor ANOVA D&B 11.2 Multiple Comparisons in ANOVA D&B 11.3 More on Single Factor ANOVA	22 Data Project Consultations
	5	27 D&B 11.3 More on Single Factor ANOVA D&B 11.4 Two-Factor ANOVA with $K_{ij} = 1$ D&B 11.5 Two-Factor ANOVA with $K_{ij} > 1$	29 Data Project Consultations
October	6	4 Review for Exam I	6 Data Project Consultations
	7	11 Exam I	13 Data Project Consultations
	8	18 D&B 12.1 The Simple Linear and Logistic Regression Models D&B 12.2 Estimating Model Parameters	20 Draft Portfolio Due at Noon Data Project Consultations
	9	25 D&B 12.3 Inferences About the Regression Coefficient β_1	27 Data Project Consultations
November	10	1 D&B 12.4 Inferences Concerning $\mu_{Y \cdot X^*}$ and the Prediction of Future Y Values D&B 12.5 Correlation	3 Data Project Consultations
	11	8 D&B 12.7 Multiple Regression Analysis D&B 12.8 Regression with Matrices	10 Data Project Consultations
	12	15 Exam II	17 Data Project Consultations
	13	22 D&B 7.3 Sufficiency D&B 7.4 Information and Efficiency (AIC)	24 Thanksgiving
	14	29 D&B 8.4 CIs for the Variance and Std. Dev. of a Normal Population D&B 9.5 Some Comments on Selecting a Test Procedure D&B 12.6 Assessing Model Adequacy	1 Final Portfolio Due at Noon on Friday 2-Dec-2022
December	15	6 D&B 13.1 Goodness-of-Fit Tests When Category Probabilities are Completely Specified	8 D&B 13.2 Goodness-of-Fit Tests for Composite Hyp. D&B 13.3 Two-Way Contingency Tables
	16	13 Final Presentation 7:30-10:00 am	15