


Syllabus

 POINT LOMA NAZARENE UNIVERSITY	Department of Mathematical, Computer, and Information Sciences MTH 4053 Advanced Applied Statistics 3 Units (TR 9:30-10:45, Rohr Science 365)
Fall 2024 September 2 nd - December 20 th	

Section:	Instructor:	Final Presentation	Phone:	Office Hours:	Email:
TR 9:30-10:45 RS 365	Professor Greg Crow, Ph.D.	Thursday, 19-Dec-2024 10:30 am – 1:00 pm	619.849.2604	Rohr Science 252 Posted in Canvas	gcrow@pointloma.edu

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.

WELCOME MESSAGE

I look forward to spending the semester exploring Multivariate Calculus with you. You will be amazed at how easy some concepts are to understand, and equally amazed at how challenging some problems are to solve. Please know that your fellow classmates and I will be here to help you through it.

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: Mathematics 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.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

1. Textbook: *Foundations and Applications of Statistics: An Introduction Using R*, by Randall Pruim (ISBN: 978-1-4704-2848-8)



2. *Modern Mathematical Statistics with Applications, 3rd Edition*, by Jay L. Devore, Kenneth N. Berk, and Matthew A. Carlton (ISBN: 978-3-030-55155-1) (Recommended)

COURSE LEARNING 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.

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. It is anticipated that students will spend a minimum of 37.5 participations hours per credit hour on their coursework. Specific details about how the class meets the credit hour requirement can be provided upon request.

ASSESSMENT AND GRADING

Grade 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 17-Oct-2024, and the Final Portfolio is due at 12:00 noon on Thursday 5-Dec-2024. The Final Presentation will be given on Thursday, 19-Dec-2024 from 10:30 am – 1:00 pm (during the Final Exam period). 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.

- **Groups:** There is 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 two person group on a two to three basis.
- **Examination Schedule.** 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.
- **Examinations.** Examinations 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.

Final Presentation: The Final Presentation will be given on Thursday, 19-Dec-2024 from 10:30 am – 1:00 pm (**during the Final Exam period**). Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the **Class Schedules** (<http://www.pointloma.edu/experience/academics/class-schedules>)_ site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

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

Grading Scale

Grades are based on the number of points accumulated throughout the course with the following exception. 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]	[82.5-87.5)	[72.5-77.5)	[62.5-67.5)	[0.0-60.0)
-	[90.0-92.5)	[80.0-82.5)	[70.0-72.5)	[60.0-62.5)	



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. We understand that life happens, if you contact your instructor prior to the due date of one written homework assignment you may request one extension as indicated above. Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work. 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. For all student appeals, faculty and students should follow the procedures outlined in the University Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

ARTIFICIAL INTELLIGENCE (AI) POLICY

You are allowed to use Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.



PLNU ACADEMIC ACCOMMODATIONS POLICY


PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu  <https://mail.google.com/mail/?view=cm&fs=1&tf=1&to=EAC@pointloma.edu>) or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. The EAC makes accommodations available to professors at the student's request.

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. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

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. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any special accommodations.

SEXUAL MISCONDUCT AND DISCRIMINATION POLICY

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that accommodations and resources are available through the Title IX Office at pointloma.edu/Title-IX (<http://pointloma.edu/Title-IX>). Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu  <https://mail.google.com/mail/?view=cm&fs=1&tf=1&to=counselingservices@pointloma.edu>) or find a list of campus pastors at pointloma.edu/title-ix (<http://pointloma.edu/title-ix>).

If you (or someone you know) have experienced other forms of discrimination or bias, you can find more information on reporting resources at www.pointloma.edu/bias (<http://www.pointloma.edu/bias>).



PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an “F” grade.

PLNU RECORDING NOTIFICATION:

In order to enhance the learning experience, please be advised that this course may be recorded by the professor for educational purposes, and access to these recordings will be limited to enrolled students and authorized personnel.

Note that all recordings are subject to copyright protection. Any unauthorized distribution or publication of these recordings without written approval from the University (refer to the Dean) is strictly prohibited.

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.

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 your professor or the [Office of Student Life and Formation \(https://www.pointloma.edu/offices/spiritual-development\)](https://www.pointloma.edu/offices/spiritual-development).



	Sunday	Mon	Tuesday	Wed	Thursday	Fri	Sat
September	1	2 Labor Day	3 Introduction Statistical Labs in R	4	5 D&B 10.4: Inferences About 2 Population Proportions D&B 10.5: Inferences About 2 Population Variances	6	7
	8	9	10 Selecting Data Sources Randomly Assigned Group 1	11	12 D&B 10.6: Inferences Using the Bootstrap and Permutation Methods D&B 11.1 Single Factor ANOVA	13	14
	15	16	17 Data Project Consultations	18	19 D&B 11.2 Multiple Comparisons in ANOVA D&B 11.3 More on Single Factor ANOVA	20	21
	22	23	24 Data Project Consultations	25	26 D&B 11.4 Two-Factor ANOVA without Replication D&B 11.5 Two-Factor ANOVA with Replication	27	28
	29	30	1 Randomly Assigned Group 2 Data Project Consultations	2	3 D&B 12.1 The Simple Linear Regression Model D&B 12.2 Estimating Model Parameters	4	5
October	6	7	8 Data Project Consultations	9	10 D&B 12.3 Inferences About the Regression Coefficient β_1	11	12
	13	14	15 Randomly Assigned Group 3 Data Project Consultations	16	17 Review for Exam I Draft Portfolio Due at Noon	18	19
	20	21	22 Exam I	23	24 Fall Break	25	26
	27	28 _____	29 Data Project Consultations Spiritual	30 _____	31 D&B 12.4 Inferences for the (Mean) Response Renewal	1 Week	2
November	3	4	5 Individuals Only as Group 4 Data Project Consultations	6	7 D&B 12.5 Correlation D&B 12.6 Investigating Model Adequacy: Residual Analysis	8	9
	10	11	12 Data Project Consultations	13	14 D&B 12.7 Multiple Regression Analysis D&B 12.9 Regression with Matrices	15	16
	17	18	19 Declare Self-Selected Group 5 Data Project Consultations	20	21 D&B 12.10 Logistic Regression Review for Exam I	22	23
	24	25	26 Exam II	27	28 Thanksgiving Day	29	30
December	1	2	3 Data Project Consultations	4	5 Final Portfolio Due at Noon on Thursday 5-Dec-2024	6	7
	8	9	10 D&B 13.1 Goodness-of-Fit Tests	11	12 D&B 13.2 Two-Way Contingency Tables	13	14
	15	16	17	18	19-Dec Final Presentations 10:30 AM – 1:00 PM	20	21