



**POINT LOMA**  
NAZARENE UNIVERSITY



## Syllabus for MTH 424 (4) Real Analysis—Fall 2011

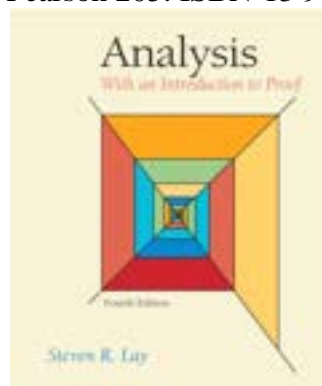
[Greg Crow](#)

RS 220  
849-2604

**Class meetings:**  
MWF 8:30-9:35  
RS 14

**Text:**

*Analysis: With an Introduction to Proof*,  
4th Edition, by Steven R. Lay,  
Pearson 205. ISBN-13 978-0131481015



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### Course Description

MTH 424 (4) Real Analysis

Real numbers, topology of Euclidean  $n$ -space, continuity, differentiation and integration theory.

*Corequisites: Mathematics 233 and 242 and Junior standing.*

### Learning Outcomes

- Students will be able to demonstrate facility with analytical concepts.
- Students will be able to write and understand proofs.
- Students will communicate effectively orally and in writing.

### Course Philosophy

Mathematics is learned primarily by **doing** Mathematics—not simply listening to it; that is, the effective learning of mathematics is an active process, involving participation. Thus, the course aims to maximize student involvement, hence student achievement.

Individual concepts in mathematics are **learned** (mastered as opposed to memorized) by thinking and working through numerous examples and exercises which involve these concepts; by this process mathematical concepts become familiar, and less abstract.

The instructor is responsible for overall planning, for directing instructional activities, and for evaluation of student achievement.

You are ultimately responsible for your own achievement. For example, you are responsible for meeting all scheduled activities of the course, such as class meetings, problem assignments, exams, and the final examination; you are also responsible for regular work outside of class in preparation for class lectures and discussions.

### Proofs

The best way to learn to write proofs is to practice writing them. You had a brief introduction to proof writing in MTH242. In this class you will reinforce those skills as you learn new mathematics. You will be most successful in this course if you participate in all of the in-class proof writing activities, if you stay current with your homework and if you re-write proofs that have been returned to you containing errors (either on homework or exams).

### Grading Policies

Grading Distribution	Points
One Mid-Term Examination	250
Proof of the Week	200
Homework (Text Exercises)	200
Final Exam	350
Total	1000

### Grading scale

Grades are based on the number of points accumulated throughout the course.

Approximate minimal percentages required to obtain a given grade are:

Grading Scale in percentages	A	B	C	D
+		(87.5, 90)	(77.5, 80)	(67.5, 70)
	[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)

### Grade components

The grade components are homework (text exercises), tests (class and laboratory), and the final examination.

- **Late work.** A written assignment or computer assignment is late if it is not received at the beginning of class on the due date. Late work need not be accepted. Work accepted late may be assessed a penalty. Make-up tests will only be given by arrangement with the instructor for reasons of documented emergency. Homework will be assigned on most class days and the entire week of homework will be due the following Wednesday.
- **Accuracy of solutions.** Written assignments and examination questions and problems must be formulated carefully in terms of words and symbols used in the course. Credit is determined by the degree to which answers and solutions respond to the specific question or problem stated. Maximize your credit by learning the language and symbols of the course.
- **Written Assignments.** Collected assignments must be prepared in a style suitable for grading. The following guidelines are used to determine credit:
  - the organization must be easy to follow
  - the work must be legible

- complete solutions must be written for problems (not just answers); answers must be clearly marked
- use complete sentences to answer questions
- **Electronic Assignments.** Assignments sent in as attachments must be prepared in a style suitable for grading. The following guidelines are used to determine credit:
  - the organization must be easy to follow
  - the formatting must enhance the organization
  - complete solutions must be written for problems (not just answers); answers must be clearly indicated
  - use complete sentences to answer questions
- **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.

This instructor does not intend to accept excuses such as poor communication with parents, benefactors, surf team sponsors and/or travel agents.

### **Attendance**

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 in which a student is registered is considered essential to optimum academic achievement. Therefore, regular attendance and participation in each course are minimal requirements to be met. There are no allowed or excused absences except when absences are necessitated by certain university-sponsored activities and are approved in writing by the Provost. Whenever the number of accumulated absences in a class, for any cause, exceeds ten percent of the total number of class meetings, the faculty member has the option of filing a written report to the Vice Provost for Academic Administration which may result in de-enrollment, pending any resolution of the excessive absences between the faculty member and the student...If the date of de-enrollment is past the last date to withdraw from a class, the student will be assigned a grade of W or WF (no grade). There are no refunds for courses where a de-enrollment was processed.” (see catalog for full text)

### **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.

### **Academic Accommodations**

While all students are expected to meet the minimum academic standards for completion of this course as established by the instructor, students with disabilities may require academic accommodations. At Point Loma Nazarene University, students requesting academic accommodations must file documentation with the Disability Resource Center (DRC), located in the Bond Academic Center. Once the student files documentation, the Disability Resource Center will contact the student’s instructors and provide written recommendations for reasonable and appropriate accommodations to meet the individual needs of the student. This policy assists the university in its commitment to full compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities (ADA) Act of 1990, and ADA Amendments Act of 2008, all of which prohibit

discrimination against students with disabilities and guarantees all qualified students equal access to and benefits of PLNU programs and activities.

Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class.

### **Academic Honesty**

The Point Loma Nazarene University community holds the highest standards of honesty and integrity in all aspects of university life. Academic honesty and integrity are strong values among faculty and students alike. Any violation of the university's commitment is a serious affront to the very nature of Point Loma's mission and purpose.

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. Such acts include plagiarism, copying of class assignments, and copying or other fraudulent behavior on examinations. For more details on PLNU's policy go to: <http://www.pointloma.edu/experience/academics/catalogs/undergraduate-catalog/point-loma-education/academic-policies>

A student who is caught cheating on any item of work will receive a zero on that item and may receive an "F" for the semester. See the PLNU Catalog for a further explanation of the PLNU procedures for academic dishonesty.

### **Classroom Attire**

All students are expected to dress in ways that make the classroom a place where all students are comfortable and can work efficiently. Distracting attire is not permitted in the classroom. For example, attire associated with the "rush" activities of fraternities and sororities simply causes too many distractions in the classroom. If you choose to "rush" one of the fraternities or sororities, please make sure the "rush" officials know that "rush" attire will not be allowed in this classroom.

### **Final Exam: Date and Time**

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. 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 change the exam date and time for that particular student. The final exam time for this course is **Wednesday 14-Dec-2011 from 8:00-10:00 am.**

The Final Exam is a **Comprehensive** Examination.

	S	M	T	W	R	F	S		
<b>Aug</b>	28	30 (Tuesday) – No Class Section 1 Logical Connectives			31 – No Class Section 5 Basic Set Operations	1	2 Review Section 1 Section 2 Quantifiers	3	
<b>September</b>	4	<b>Labor Day</b>		6	7 Section 3 Techniques of Proof: I	8	9 Section 4 Techniques of Proof: II	10	
	11	12 Section 5 Basic Set Operations		13	14 Section 6 Relations	15	16 Section 7 Functions	17	
	18	19 Section 8 Cardinality		20	21 Section 10 Natural Numbers and Induction	22	23 Proof Writing Workshop	24	
	25	26 Section 11 Ordered Fields <b>Spiritual</b>		27	28 Section 12 The Completeness Axiom <b>Renewal</b>	29	30 Section 12 The Completeness Axiom <b>Week</b>	1	
<b>October</b>	2	3 Section 13 Topology of the Reals		4	5 Section 13 Topology of the Reals	6	7 Section 14 Compact Sets	8	
	9	10 Section 14 Compact Sets		11	12 Section 16 Convergence	13	14 Section 17 Limit Theorems	15	
	16	17 Proof Writing Workshop		18	<b>Exam</b>		20	21 <b>Fall Break</b>	22
	23	24 Section 18 Monotone Sequences and Cauchy Sequences		25	26 Section 20 Limits of Functions	27	28 Section 21 Continuous Functions	29	
	30	31 Section 22 Properties of Continuous Functions		1	2 Section 23 Uniform Continuity	3	4 Section 25 The Derivative	5	
<b>November</b>	6	7 Section 26 The Mean Value Theorem		8	9 Section 27 L'Hospital's Rule	10	11 Section 28 Taylor's Theorem	12	
	13	14 Section 29 The Riemann Integral		15	16 Section 30 Properties of the Riemann Integral	17	18 Section 31 The Fundamental Theorem of Calculus	19	
	20	21 Section 32 Convergence on Infinite Series		22	23 Thanksgiving Recess		24	25	26
	27	28 Section 33 Convergence Tests		29	30 Section 34 Power Series	1	2 Section 35 Pointwise and Uniform Convergence	3	
<b>December</b>	4	5 Section 36 Applications of Uniform Convergence		6	7 Section 37 Uniform Convergence of Power Series	8	9 Review	10	
	11			13	<b>Final Exam 8:00-10:00</b>		15	16	17