Point Loma Nazarene University
MTH3033 Differential Equations
Spring 2020
3 Units, TuTh 11:00pm–12:15pm
Location: Rohr Science 295

Instructor: Katie Rainey, Ph.D.   **Department Phone:** 619.849.2219
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Textbook: *Fundamentals of Differential Equations*, Ninth Edition, by Nagle, Saff and Snider.

Course Description: Ordinary differential equations, solutions by analytical and numerical methods in the context of real-world applications. A brief introduction to partial differential equations and Fourier series.

Prerequisite: Calculus III (MTH274).

Other Requirements: There may be occasional programming assignments. Access to MATLAB® or similar software is required. Freemat and Octave are two free alternatives to MATLAB, either of which will suffice for this course.

Course Goals: Students should gain the ability to properly identify types of differential equations and apply a wide range of analytical methods for solving differential equations. Students should be able to apply the basic numerical methods for solving differential equations.

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.

Examinations: There will be two midterms and a final exam. The final exam is comprehensive and will be held on **Thursday, May 7, 2020, 10:30am–1:00pm, Rohr Science RS295**. All or some portion of the exams may be take-home, in which case they will be due on the date of the scheduled exam.

Homework: Homework sets will be assigned for each class period and will be due at the beginning of the class period on the Tuesday of the following week (usually). *Doing all of the assigned homework before the next class will almost certainly ensure that you successfully master the course material. The exams will be like the homework; there should be no surprises.*

You must be persistent in solving homework problems; when you need help, ask me, fellow classmates, other friends, the internet, or your favorite MICS professor, but be sure to keep up with the pace of the class.

Projects: There will be several projects throughout the semester. These are designed to improve your ability to communicate technical ideas and to give you a chance to apply differential equations to real world problems.

Office Hours: I am an adjunct instructor employed full-time off-campus. As such, I will not hold regularly scheduled office hours, but I will be available to meet with you by appointment

(usually before or after class). Do not hesitate to ask questions during lecture, or to approach me afterwards.

Discussion on Canvas: Rather than email questions to me about homework or other topics, I encourage you to post your questions to Canvas where your fellow students can help you out or benefit from the same answers. You can also reinforce your understanding of the course material by answering other students' questions.

Participation in discussions on Canvas will be graded as an assignment in the homework category. You will get one point for each question asked or answered on Canvas, for up to 20 points, but the assignment will only be scored out of 10 points. That means that you are **required** to ask or answer 10 questions (roughly one per homework assignment), but you can also get up to 10 extra credit points for asking or answering more.

Grade Distribution:

Projects	20%
Homework	15%
Midterm Exams	40%
Final Exam	25%

Letter Grade Distribution:

>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 59.99	F

Course Policies:

- **Late Work:** A written assignment or computer assignment is late if it is not received at or before the beginning of class on the due date. Late work will not be accepted unless there is a documented emergency.

- **Missed Exams:** Make-up tests will be given only by arrangement with the instructor for reasons of documented emergency.

- In-class exams are closed-book, though you will be allowed a "cheat sheet" (one sheet of paper, no larger than 8.5" × 11", on both sides of which you may write or type).

- Assignments collected must be prepared in a style suitable for grading. The projects will be graded on clarity and writing quality.

  - the organization must be easy to follow

  - the work must be typed

  - complete solutions must be written for problems (not just answers); solutions must be clearly marked

  - use complete sentences to answer questions

- One lowest homework score will be dropped.

- Course policies, assignments, and due dates are subject to change at the discretion of the instructor.

Course outline:

Outline is tentative and subject to change.

Week	Dates	Subject	Sections
1	Th 1/16	Introduction	1.1, 1.2
2	Tu 1/21	Introduction	1.2, 1.3
	Th 1/23	First Order Differential Equations	2.2
3	Tu 1/28	First Order Differential Equations	2.3, 2.4
	Th 1/30	First Order Differential Equations	2.6
4	Tu 2/4	Mathematical Models	3.2, 3.4
	Th 2/6	Numerical Methods	1.4, 3.6
		Hand out Midterm 1 (take home)	
5	Tu 2/11	Midterm 1 Due	
		Linear Second-Order Equations	4.1, 4.2
	Th 2/13	Linear Second-Order Equations	4.3, 4.4
6	Tu 2/18	Linear Second-Order Equations	4.5, 4.6
	Th 2/20	Linear Second-Order Equations	4.6, 4.7
7	Tu 2/25	Linear Second-Order Equations	4.9, 4.10
	Th 2/27	Introduction to Systems	5.1,2
8	Tu 3/3	Project 1 Due	
		Laplace Transforms	7.1, 7.2
	Th 3/5	Laplace Transforms	7.3, 7.4
		SPRING BREAK	
9	Tu 3/17	Laplace Transforms	7.4, 7.5
	Th 3/19	Laplace Transforms	7.6, 7.7
10	Tu 3/24	Laplace Transforms	7.7, 7.8
	Th 3/26	Midterm 2 (in-class)	
11	Tu 3/31	Series Solutions	8.3
	Th 4/02	Series Solutions	8.5, 8.6
12	Tu 4/7	Series Solutions	Finish up 8, 10.1
	Th 4/9	NO CLASS	
13	Tu 4/14	Project 2 Due	
		Partial Differential Equations	10.2, 10.3
	Th 4/16	Partial Differential Equations	10.3, 10.4
14	Tu 4/21	Partial Differential Equations	10.5
	Th 4/23	Partial Differential Equations	10.6
15	Tu 4/28	Guest lecture	
	Th 4/30	Fun stuff, review	
	M 5/07	FINAL EXAM	Covers all course material

University Mission: 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.

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 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 in the Undergraduate Academic Catalog. `http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278`

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 Accommodation: 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 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.

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

Final Exam Date and Time: Thursday May 7, 2020, 10:30am–1:00pm, RS295. 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.

Copyright Protected Materials: 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.

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.