MTH373 Modeling
MWF 7:30-8:20 RS15

Instructor: Ryan Botts, Ph.D.
Office Hours: MWF 1:00-2:30
TTh 1:00-2:45

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Course Description
A problem based course that explores mathematical modeling techniques using a variety of computational methods. Also examines how mathematics can be applied to answer specific questions. Includes problems from biology, chemistry, physics, business and other non-mathematical disciplines. Written report and oral presentation are required.

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 be able to speak about their work with precision, clarity and organization.
Students will be able to write about their work with precision, clarity and organization.
Students will collaborate effectively in teams.

Required Materials
Textbook: *Mooney, D. and Swift, R. A Course in Mathematical Modeling. ISBN: 0-88385-712-X*
Access to Excel and Freemat
A porcupine

Course Goals
Students will be able to

- Formulate a formal mathematical model describing a real world scenario.
- Apply a variety of mathematical tools to solve or understand these models.
- Translate mathematical solutions into the physical domain.
- Explain model solutions and descriptions both verbally and in writing.

Mathematical tools used:

- Differential equations
- Discrete and continuous stochasticity
- Linear algebra

Grading Policies
Grades will be computed based on your scores on the following assignments:

Assignment	Due Date	Points
Energy Consumption paper	8/31	20
Lab	9/7	30
Discrete DE paper	9/14	50
Discrete Stochasticity paper	9/28	50
Queuing presentation	10/12	50
Exam	10/17	200
Project 1 Presentation	11/5-11/7	250
Project 2 Presentation and Paper	12/12*	350

* note that a rough draft of this paper is due earlier

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)

- **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 will not be accepted. Make-up tests (or the exam) will be given only by arrangement with the instructor for reasons of documented emergency.
- **Format for Projects**. 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

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.

Final Exam: 8:00-10:00 Dec. 12, 2012
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.

	S	M	T	W	T	F	S
	26	27 Student Transition	28 Intro	29 Energy consumption	30	31 Exploration of E.C. Peer review of Write-up	1
September	2	3 **Labor Day**	4	5 Intro do Discrete Differential equations	6	7 Excel and Freemat Lab No class	8
	9	10 DDE. Application	11	12 Exploring DDE model	13	14 Peer review DDE write-up	15
	16	17 Other DDE models	18	19 Other DDE models	20	21 Population demographics	22
	23	24 Discrete Stochasticity **Spiritual**	25	26 Understanding DS **Renewal**	27	28 Peer review of write-up **Week**	29
	30	1 Queuing models: An application of SM's	2	3 Cont. Stoch: Sampling from distributions	4	5 Sampling from distributions in Excel	6
October	7	8 Implement Queuing model	9	10 Testing and analyzing queuing models	11	12 Informal 15 min. Presentations	13
	14	15 Empirical Modeling overview	16	17 **Exam**	18	19 Fall Break	20
	21	22 Group 1 meeting	23	24 Group 2 meeting	25	26 Group 3 meeting	27
	28	29 Group 1 progress report (10 min) and meeting	30	31 Group 2 progress report And meeting	1	2 Last Day to Drop Group 3 progress report and meeting	3
November	4	5 Group 1 and 2 (25 min presentation)	6	7 Group 3 presentation (25 min) Submit final project proposal (All groups)	8	9 Last Day to Drop Individual meetings to discuss proposals	10
	11	12 Group 1 meeting	13	14 Group 2 meeting	15	16 Group 3 meeting	17 Home coming
	18	19 15 min progress reports (all groups)	20	21 Thanksgiving Recess	22	23	24
	25	26 Group 1 meeting	27	28 Group 2 meeting	29	30 Group 3 meeting Rough draft of final paper	1
December	2	3 Group 1 Project Peer Review	4	5 Group 2 Project Peer Review	6	7 Group 3 Project Peer Review	8
	9	10	11	12 **Final Exam: 8:00-10:00am** Hand-in final paper Group presentations 30 min.	13	14	15