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Spring 2-1-2022

### M 414.01: Deterministic Models

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**Department of Mathematical Sciences**  
**Spring 2022, Math 414**  
**Deterministic Models**

**Instructor:** Professor Emily Stone      **E-mail Address:** stone@mso.umt.edu  
**Office:** MATH 313      **Office Phone:** 243-5365  
**Office Hours:** M 2-3, W 12-1, F 10-11

**Course Description:** In this course we will cover much of the textbook by Strogatz, primarily one and two dimensional flows, and bifurcations thereof. Applications in the physical sciences and biology will be central to the development of the theory and the solution techniques.

**Learning Outcomes:** Upon completion of this course, a student will be able to

1. Formulate models from various scientific fields in terms of ordinary differential equations (ODEs, a.k.a. dynamical systems). Develop a way of thinking oriented towards modeling.
2. Use advanced techniques of quantitative analysis of dynamical systems.
3. Use advanced techniques of qualitative analysis of dynamical systems.

**Text:** • *Nonlinear Dynamics and Chaos*  
Steven H. Strogatz, Addison-Wesley

**Prerequisite:** An ordinary differential equations course

**Important Dates:**

Jan. 26:	Last day to drop via Cyberbear
Feb. 7:	Last day to drop classes with instructor approval
Feb 21:	Presidents' Day Holiday - no classes
May 6:	Last Day for Drop Petitions

**Exams: (dates tentative, to be confirmed in class)**

Feb. 25 (Friday):	Exam 1
April 4 (Monday):	Exam 2
May 11 (Wednesday):	10:10-12:10 Final Exam Period: Project Presentations

**Grading:**

Homework	30% of course grade
Exams (2)	40% of course grade
Final Project & Presentation	30% of course grade

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## SOME COMMENTS

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### **Homework Assignments:**

Homework will be assigned weekly up until the second exam, after which we will switch to working on projects. Homework grades will have 2 parts, a completion grade (for completing the problems and handing it in) and a corrections grade. Homework will be collected, graded for completeness and returned. The solutions will then be made available, and you will have time to correct your homework and resubmit for a corrections grade. If you hand-in your HW after the solutions are made available, you will only receive the corrections part of the grade.

### **Readings:**

I will be working mainly from the text, but will bring in supplemental material as needed. This will be posted on our Moodle page, along with any other additional resources.

### **Exam Information:**

There will be two mid-term exams, taken in class, and arranged so that there is extended time available for their completion.

### **Final Project/Presentation:**

Depending on how many people are enrolled in the course, there will be a final project for each individual, or possibly in pairs. The project will have a written report and an oral presentation. Presentations will be given during the last 2 weeks of class, and during the final exam period, Wednesday May 11th 10:10-12:10. The report will also be due during finals week.

### **Grading:**

Grading will be done on the usual percentage scale, 90-100% A, 80-89 % B, etc.

### **Student Conduct:**

All students need to be familiar with the Student Conduct Code. You can find it in the “A to Z Index” on the UM home page. All students must practice academic honesty. (That specifically means not copying homework solution sets, sharing information on exams, or plagiarizing material in written reports.) Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

### **For any student with a disability:**

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, ode@umontana.edu, or visit [www.umt.edu/disability](http://www.umt.edu/disability) for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish.

### **Final Note:**

Announcements made in class are considered addenda to this syllabus. Midterm exam dates are tentative, make sure you stay informed as to the progress of the class.