Course Overview

A differential equation for a function is an equation involving some of its derivatives. For example,

$$u''(t) = u(t) + 1$$

is a differential equation for the function $u(t)$. You should verify that $u(t) = e^t + 1$ is a solution. In the past you have seen algebraic equations such as

$$u^3 - 2u + 1 = 0$$

where the goal is to find a value of u that solves the equation (e.g. $u = 1$). Differential equations are much harder to solve because we are seeking a **function** that solves the equation.

Differential equations occur ubiquitously throughout the sciences and in other quantitative fields. The first section of our textbook gives examples from thermodynamics (Newton's Law of Cooling), population dynamics (population models), physics (velocity, acceleration, and position), chemistry (rates of reactions), and electrical engineering (voltages in circuits). Any time you model the rate of change of some quantity, there is an associated differential equation.

The specific topics covered in this class are: first order differential equations, mathematical modeling using differential equations, numerical solutions to differential equations, higher order linear equations, systems of differential equations, and Laplace transforms.

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	`damaxwell@alaska.edu`
Phone	474-1196
Web	`http://www.math.uaf.edu/~maxwell`
Text	**Fundamentals of Differential Equations**, 8th edition, *Nagel, Saff & Snider*

Prerequisites

The course prerequisite is a C or better in Math 202 (Calculus III). We will be using differential and integral calculus frequently in this course.

Class Time

There will be three one-hour lecture classes each week. Although I'll be doing a lot of the talking during lectures, you are strongly encouraged to stop me at any point to ask questions. I'll try to ask you questions along the way as well. Lectures are more interesting and relevant when you participate actively.

Lecture Times
MWF 9:15-10:15 Gruening 409

Office Hours

My office hours will be posted on my web site and outside my office door. You are very welcome to schedule an appointment outside of my regular office hours; please send me an email and we will arrange a time.

Homework and Quizzes

Like most math classes, the best way to learn the material in this class is to work on problems. So we'll have regular homework assignments.

Homework will be assigned a little more frequently than once a week. You can expect to hand in homework as follows: Wednesday, Monday, Friday, Wednesday, Monday, Friday, etc. Homework will be due two classes later than it is assigned, so homework assigned on a Wednesday (for example) will be due on the following Monday. The hope is that you will be motivated to keep on top of the homework if it is due more frequently than once per week.

Homework will be due in my box in the Chapman office, by 4:00pm on the day it is due.

I will accept from every student a single late homework without any questions. Hand in a piece of paper when the homework is due with a note on it to let me know that you are taking your late homework, and and the homework will then be due on the next homework's due date (or one week later, whichever comes first).

If I feel that there is a need to emphasize a routine computational technique, I may hold a 10-15 minute quiz on that topic. Quizzes will be announced in advance along with the subject to be covered. Quizzes cannot be made up unless there are extenuating circumstances.

Each homework will be weighted equally (despite the number of 'points' on the homework), and each quiz will have the weight of a single homework assignment.

Labs

In addition to the more routine homework, there will be about four labs (i.e short projects) covering more in-depth material. Some of these labs will come from the **Group Project** sections of the text. You will work in groups of two or three on your labs, and a common grade will be assigned to all members of the group. More details on the labs, and the expectations concerning group work, will be announced along with your first lab.

Matlab/Octave

From time to time we will use Matlab on assignments and for the labs. I do not expect that you have any Matlab experience, and I will provide materials to help you get up to speed in using Matlab. Matlab is available from the bookstore at an educational price of about $100. You also have the option of using free software, Octave, that has a Matlab-like interface. It's a little more awkward to use Octave, but it is free. Instructions for installing Octave are available on my web page.

Math Lab

The Math Lab in Chapman 305 has tutors available at scheduled times throughout the week. The tutors are most experienced at answering calculus questions, but you might find that some of the tutors (especially the graduate students) would welcome the opportunity to discuss something other than calculus. The hours for the Math Lab are posted on its door and on a link from the department's home page at `http://www.dms.uaf.edu`.

Midterms

There will be two midterm exams. These will **not** be comprehensive, and are tentatively scheduled for Friday, October 7 and Monday, November 7.

Final Exam

There will be a comprehensive final exam 8:00–10:00 on Wednesday, December 14.

Evaluation

Course grades will be determined as follows:

Homework and Quizzes	23%
Labs	12%
Midterm 1	20%
Midterm 2	20%
Final	25%

Letter grades will be assigned according to the following scale. This scale is a guarantee. I reserve the right to lower the grade cutoffs, but I will not raise them.

A+	97–100%	C+	77–79%	F	≤ 59
A	93–96%	C	70–76%		
A-	90–92%	C-	(not given)		
B+	87–89%	D+	67–69%		
B	83–86%	D	63–66%		
B-	80–82%	D-	60–62%		

Tentative Schedule

Week	Topics and Events
9/2	Section 1.1, 1.2
9/5 – 9/9	Chapter 1.3, 1.4 Monday: Labor Day
9/12 – 9/16	Chapter 2
9/19 – 9/23	Chapter 2
9/26 – 9/30	Chapter 3
10/3 – 10/7	Chapter 3 Friday: First Midterm
10/10 – 10/14	Chapter 4
10/17 – 10/21	Chapter 4
10/24 – 10/28	Chapter 4 Friday: Last day to withdraw with a 'W'
10/31 – 11/4	Chapter 4, 5.1 5.2
11/7 – 11/11	Chapter 5.4, 9 Monday: Second Midterm
11/14 – 11/18	Chapter 9
11/21 – 11/25	Chapter 9, 7 Thursday: Thanksgiving
11/28 – 12/2	Chapter 7
12/5 – 12/9	Chapter 7
12/12	Exam Week Monday: Last day of class

Rules and Policies

Attendance
Attend every class. Although attendance is not directly part of your grade, it is very easy in a math class to fall behind after skipping even one class. In my experience, people who skip math classes fail math classes. Nobody wants that.

Collaboration
You are encouraged to work together in solving the written homework problems. But each student must write up his or her solutions independently. Cloning (copying another student's homework) is not permitted and is a form of Academic Dishonesty (see below). If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped you credit.

Late Homework
Written homework is due at 4:00 on the date due.

You may turn in one homework late, with no questions asked, so long as you notify me before the time the homework is due. If there are extenuating circumstances in your life you may be able to hand in more than one late homework. Please see me in such an event.

Makeup Exams
You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Disabilities Services
I will work with the Office of Disabilities Services (203 Whitaker, 474-7043) to provide reasonable accommodation to students with disabilities.

Cell Phones
Turn off your cell phone before you come to class.

Incomplete Grade
Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals
A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty
Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.