MATH 210: Ordinary Differential Equations

Mathematics Department, Bryn Mawr College, Spring 2007

Professor: Victor Donnay	Lecture: Mon, Wed 2:30-4pm
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Co-requisites: You should have taken, or presently be taking, one of either Multi-variable calculus, Math 201, or Linear Algebra, Math 203. If you have not taken Multi-variable calculus, you will need to learn some additional background material during the term. Please speak to me if you have not had or are not now taking one of these courses.

Text: Differential Equations by Blanchard, Devaney, and Hall, 3nd edition, published by Brooks/Cole.

Course Web Site: accessible from Prof. Donnay's homepage

All materials for the course will be found on the web site or at the course Blackboard site.

Goals of the Course: In this course, you will:

Do mathematical modeling which involves studying real world situations using mathematics; in our case, particularly using differential equations.
Develop an understanding of linear and non-linear systems and how feedback effects in non-linear systems can lead to unexpected behaviors.
Examine differential equations using graphical (quantitative), numerical and analytical methods.
Communicate your mathematical reasoning in writing and verbally.
Develop your ability to work as an independent and self-sufficient learner:
- What to do when you do not know what to do
- How to take what you have learned in one situation and apply it to a new and different situation (transfer of knowledge)
- Get comfortable with not knowing the answer immediately
- Learn material we have not covered in class by reading the book and applying this newly learned information to solve problems.

Become part of a community of learners who support, encourage and learn from one another.

We will cover most of the following sections from Blanchard et al:

Ch.1: Section 1, 2, 3, 4, 5, 6, 7, 8, 9

Ch. 2: Section 1, 2, 3, 4, 5

Ch. 3: Section 1, 2, 3, 4, 5, 6, 8

Ch. 4: Section 1, 2

Ch. 5: Section 1, 2

Ch. 7: Section 1, 2, 3, 4

Appendix B.

Plus additional topics as time and interest permits.

Additional Reading: In addition to our text, we will have supplementary readings that show how the material we are learning in the course relates to real world issues and there will be homework assignments involving the reading.

Computer Assignments:

There will be extensive use of the computer during the course both during class time (with laptops) and as part of homework assignments. We will use the software that comes with the textbook: DE Tools. In addition to you having your own copy that you can use on computers around campus, there are copies on the machines (macs) in the math dept computer lab (Rm. 354).

You will be encouraged to "play around" with the modules in this program to develop a graphical understanding of the concepts in our course. We will also use and write simple programs (possible systems include Excel, Mathematica, Differential Systems, Stella). No previous computer experience is necessary or assumed.

We have a TA who will be available to give you help both on the regular homework problems and on the computer problems.

Exams:

There will be a mid-term exam, a final exam (both take home exams) and a final project. The **tentative** schedule for the exams is:

1st exam: probably in the 5th (Feb 19-237) or 6th week (Feb 26- March 2).

2nd exam: probably in the 12th week (April 16 -20).

Final Project: Due during exam period.

Students will work in two person teams on a project of their choosing. The project might involve using material from the course to study an applied situation, examining a theoretical issue in more depth or studying a topic that extends the material from the course. Projects will be written up in the form of a paper (10 - 15 pages).

Homework:

Homework will be assigned each class via Blackboard. **Late work will not be accepted** unless there is a special situation (ex. serious medical problem) and you get my permission **ahead of time**.

The best way to learn mathematics is by doing lots of problems. Do not limit yourself to just doing the problems that you are required to hand in. You should do some problems after each class. This way, the next lecture will make a lot more sense. Do not wait till the last minute and do all the problems at once. You will have much more trouble understanding the lectures and will therefore be using your time inefficiently.

In addition to my office hours, you can also get help at the weekly problem session that we will be scheduling.

Classroom:

During class, there will be a mixture of lecturing by the professor and time spent by the students working out problems and discussing their results in groups. Research has shown that this type of active participation leads to improved learning.

The group work does not go well when members of the group are absent. Therefore it is important that you attend to class. Please be respectful of your fellow students.

If you decide to take this course, you must commit to attending class regularly. Attendance will be taken and substandard attendance will be taken into account in deciding

Final grades will be determined using the following percentages:

Homework	25%
Test 1	25%
Test 2	25%
Final Project	25%
Total	100%