MTH306 – Ordinary Differential Equations
Section F Spring 2014

When: Monday, Wednesday, and Friday 1:00PM-1:50PM
Where: NSC 205

Instructor: Avner Peleg
Office: Math Building, room 325
Phone: 645-8811
E-mail: apeleg@buffalo.edu
Office hours (tentative): Monday 11:00AM-12:00noon, Wednesday 4:00PM-5:00PM.

Textbook: Differential Equations and Boundary Value Problems: Computing and Modeling, by C. Henry Edwards and David E. Penney, second custom edition for the University at Buffalo.

Prerequisites: MTH142 (College Calculus II) with a grade of C or higher.

Tentative syllabus: Chapters 1-8 of the textbook.

Course description: This is an introductory course on ordinary differential equations (ODEs). The course introduces the basic analytic and numerical methods for solving ordinary differential equations as well as methods for analyzing the behavior of the solutions. The course covers first-order and high-order ordinary differential equations as well as systems of first order ordinary differential equations. During the course the students make use of a mathematics software package to analyze and solve differential equations

Learning outcomes: The students should understand the following concepts and know how to implement them in solving ordinary differential equations and in analyzing the behavior of the solutions. Homework for each topic will be assigned from the corresponding section in the textbook.

(**1**) **First-order ODEs:** introduction (1.1, 1.2), separable ODEs (1.4), slope fields (1.3), existence and uniqueness of solutions (1.3), first-order linear ODEs and the method of integrating factor (1.5), substitution methods (1.6).
(**2**) **Mathematical modeling and numerical solution methods:** modeling with ODEs (2.1), equilibrium solutions, stability, and the phase line (2.2), acceleration-velocity models (2.3), numerical solution – Euler's method (2.4).
(**3**) **Higher-order linear ODEs:** second-order linear ODEs (3.1), nth-order linear ODEs (3.2, 3.3), mechanical oscillations (3.4), nonhomogeneous linear ODEs with constant coefficients (3.5), forced oscillations (3.6).
(**4**) **Systems of first-order ODEs:** introduction (4.1), matrices and linear systems (5.1), solution of homogeneous linear systems with constant coefficients (5.2, 5.4), numerical solution for systems – Euler's method (4.3).
(**5**) **Nonlinear systems of first-order ODEs:** equilibrium solutions, stability, and the phase plane (6.1, 6.2), ecological models (6.3), mechanical oscillations (6.4).
(**6**) **Laplace transforms:** introduction (7.1), solving ODEs with Laplace transforms (7.2), partial fractions (7.3), derivatives, integrals, and products of Laplace transforms (7.4), solving ODEs with periodic, piecewise continuous, and impulse forcing (7.5, 7.6).
(**7**) **Power series methods:** introduction (8.1), series solution near ordinary points (8.2), series solution near regular singular points (8.3).

Recitations: Recitations begin in the second week of the semester. Some recitations will be devoted to solving problems and discussing additional examples. These recitations will be held in Talbert 111 on Monday between 2:00PM-2:50PM (section F1), in Capen 260 on Wednesday between 9:00AM-9:50AM (section F2), and in Park 146 on Friday between 2:00PM-2:50PM (section F3). Other recitations will be in the computer lab, Baldy 8B. Please follow in-class announcements for information on recitation locations.

Homework: Homework will be assigned each week. Homework assignments will be usually announced in class and collected by the TA in the recitations. In weeks when recitations do not take place, homework assignments will be collected in class by the instructor. Selected homework problems on each assignment will be graded. Homework is an important component of the course and is worth 10% of the final grade. Notice that: (1) Late homework will not be accepted. (2) It is your responsibility to show your work and to present it in readable form. Unreadable answers or answers without justification will not receive credit.

Quizzes: There will be several quizzes during the semester. Each quiz will be 10 minutes long and will take place during the class. The total weight of the quizzes in the final grade is 10%.

Exams: There will be one midterm exam and a final exam. The midterm exam is scheduled for Monday, March 24 between 1:00PM-1:50PM in NSC 205. The final exam is scheduled for Friday, May 16 between 11:45AM-2:45AM in NSC 205. The weight of the midterm exam is 25%, and the weight of the final is 40%.

Project: One lab project will be assigned during the recitations that will be held in Baldy 8B. The project will involve both pen-and-paper calculations and calculations using the software package Maple. Afterwards, you will be required to summarize the project in a written report. Work on the project will be done in pairs. Late reports will not be accepted. The project is worth 15%.

Grade:
Homework	10%	
Quizzes	10%	
Project (1)	15%	
Midterm (1)	25%	
Final	40%	

The final number grade will be translated to a letter grade, and the translation will not be worse than:

85-100	A
70-84	B
60-69	C
50-59	D
0-49	F

The boundaries for plus/minus grades (A-, B+, B-, etc.) will be determined only after the final exam.

Course web site: http://www.math.buffalo.edu/~apeleg/mth306y.html
This web site will be updated with announcements, homework assignments and other useful resources. It is recommended that you visit the web site on a regular basis.

Maple: Maple is a symbolic mathematics software package that we will use to analyze and solve differential equations. In particular, we will make extensive use of Maple in the lab project. Maple is on all public IT computers on campus. You can also download a version of Maple for your own computer

by going to http://www.buffalo.edu/ubit/service-guides/software.html and choosing one of the links under "Download Software". If you have not previously used Maple it would be good to start getting familiar with it right from the beginning of the course.

Attendance: Students are expected to attend every scheduled class. Three good reasons to attend classes are: (1) Some of the examples discussed in class do not appear in the book. These examples may appear as part of homework, quizzes, the project, the midterm exam, or the final exam. (2) If you miss a quiz for an unjustified reason, you lose all points given for the quiz. (3) Attendance will be checked occasionally.
All students attending the class must be registered for the class.

Make-up exams: t**here will be no make-up exams for the midterm and quizzes.** If due to severe circumstances beyond your control (car accident, illness, etc.), you will not be able to take the exam, please call me immediately (before the exam) and let me know your situation. If you have a good reason and can present convincing documentation as to why you are not able to take the exam, your final grade will be calculated without taking into account that particular exam.

Academic integrity: Students are expected to behave in accordance with the university policy on academic integrity. The guiding principle of academic integrity is that a student's submitted work must be the student's own. Cheating and plagiarism will result in formal charges.
Please notice: a random sample of papers in each exam, quiz, and homework assignment will be photocopied.

Incomplete: A grade of incomplete (I) will be assigned only under extraordinary circumstances, which are beyond the student's control (like a non-elective surgery during the last week of class).

Students with disabilities: If you have a diagnosed disability (physical, learning or psychological), which will make it difficult for you to carry out the coursework as outlined, or requires accommodations such as recruiting note takers, readers, or extended time on exams and/or assignments, please advise me during the first two weeks of the course, so that we may review possible arrangements.

Studying strategy: Below are some tips on how to do well in the course.
(1) Review background material at the beginning of the semester.
(2) Study regularly throughout the semester.
(3) Read each topic in the book before class.
(4) Review the theory afterwards using your notes and the book.
(5) Do the homework regularly.
(6) Seek help from me or from the TA when you don't understand something.

Math Help Center: If you need assistance you can also use the services of the Math Help Center, which is located in Room 110 of the Math Building. The Math Help Center will be open Monday through Friday 9:00AM-4:00PM starting from Monday, February 10.

Some important dates:
Mon Feb 3: Last day to add/drop the course (no record will appear on your transcript if you drop the course). (b) Last day to file "Petition to make up an Incomplete" with the Math Department.
Mon Mar 17 through Sun Mar 23: No class (Spring Recess).
Fri Apr 11: Last day to resign from the course (an "R" will appear on your transcript).
Fri May 9: Last MTH306F class.