MTH244 – Fall 2010 Differential Equations Instructor Gerry Ladas

The theory of differential equations constitutes a language that scientists and engineers use to make careful mathematical statements about the real world. MTH 244 is a lively and exciting course which is easily accessible to students who have had two semester of calculus.

Ever since Newton (1642-1727), Differential Equations have been the basis of the scientific understanding of Nature.

Differential equations are equations, which involve derivatives of unknown functions. Differential equations appear frequently in mathematical models that describe real-life situations. This a because many natural laws and hypotheses can be translated via mathematical language into equations involving derivatives. For example, derivatives appear in physics as velocities and accelerations, in geometry as slopes, in biology as rates of growth of populations, in psychology as rates of learning, in chemistry as reaction rates, in economics as rates of change of the cost of living, and in finance as rates of growth of investments.

This course is an introduction to the subject of differential equations involving one independent variable. Skills useful in solving differential equations will be developed. In addition, students will be exposed to techniques which use differential equations to model complex physical phenomena. The material in this course is basic for further study in applied mathematics, physics, engineering, chemistry, biology, and many other areas of science and the humanities.

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| INSTUCTOR: | Professor Gerry Ladas |
| OFFICE: | Lippitt 202H |
| TELEPHONE: | 874-5592 (Office) 789-8105 (Home) 874-2709 (Department) |
| OFFICE HOURS: | M 12:00-12:30, TR 10:45-11:30, and F 2-3 Also by appointment |
| TEXT: | Ordinary Differential Equations, 3rd Edition, by Finizio and Ladas, Simon and Schuster |

COURSE DESCRIPTION: We will cover most of the material in Chapters 1-7 but not necessarily in the order and way described in the text. You must attend classes and take notes and you are also expected to read thoroughly the material in the text. You need a programmable graphing calculator and you should learn at your own how to use MATHEMATICA, MAPLE or some other program. In this course we will use the technology as a supplement to thought rather than a substitute for it.

TESTS: There will be two tests schedule on Tuesday, October 19, and on Tuesday, December 7, and a cumulative FINAL EXAM as scheduled by the Registrar. There will be regular Homeworks and irregular Quizzes. **There will be no make-ups for homeworks and quizzes.**

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| GRADING: | Two Tests: | 200 points possible |
| | Quizzes: | 100 points possible |
| | Homework: | 100 points possible |
| | FINAL EXAM: | 200 points possible |
| | TOTAL: | 600 points possible |

You need 360 points to pass with a D and you need 560 points to receive an A in this class. You will also receive an A in the class if your total in the two tests and homework + quizzes is more than 380 points.

MTH 244 Prof. Gerry Ladas

Only 2 problems from each "Homework Set" will be graded, but you should submit complete solutions to all problems. Please print or type your solutions. Your homework should look neat and be stapled, otherwise it will not be graded. LATE HOMEWORK WILL NOT BE ACCEPTED.

| | Section | Homework |
|---|---|---|
| #1 | 1.3 | p. 28: 1, 3, 5, 6, 9, 18, 19, 20, 23, 24<br>Do problems 23, 24, and 37 by using Mathematica/Maple |
| #2 | 1.4 | p. 40: 3, 5, 11, 12, 19, 24, 25, 27, 37, 39 |
| #3 | 1.7<br>1.2<br>1.8 | p. 61: 1, 2, 8, 9<br>p. 17: 1, 2, 3, 5, 6<br>p. 69: 2, 3, 4, 5 |
| #4 | 2.3<br>2.5 | p. 98: 1, 2, 4, 5, 11<br>p. 11: 1, 2, 5, 6, 7, 8, 9, 10, 20, 21 |
| #5 | 2.5 | p. 112: 27, 28, 29<br>THEORY OF LINEAR DIFFERENTIAL EQUATIONS READ SECTIONS: 2.2, 2.4, 2.6, 2.7, 2.8, AND 2.10<br>Solve problems 27, 28, and 29 in Sections 2.5 also by using Mathematica/Maple |
| #6 | 2.11 | p. 144: 40, 41, 42<br>Numerical Solutions of Differential Equations<br>APPLICATIONS: READ SECTIONS 2.1.1 AND 2.11.1<br>p. 113: 33<br>p. 145: 48, 49 |
| #7 | 3.2 | p. 183: 1, 2, 3, 5, 10, 11, 12, 13, 15 |
| #8 | 4.3 | READ SECTIONS: 4.1 and 4.2<br>p. 222: 1, 3, 7, 9, 13, 37, 38, 45<br>Solve problems 37, 38, and 45 also by using Mathematica/Maple |
| #9 | 5.4 | READ SECTIONS: 5.1, 5.2, 5.3, AND 5.5<br>p. 262: 1, 2, 3, 4, 9, 10 |
| #10 | The last homework is the practice final exam and is DUE on December 7 | |