Spring **2004**

DIFFERENTIAL EQUATIONS

MATH 372, Section 01

Instructor: Dr. Ming Fang
When and Where: 8:00-8:50am Monday, Wednesday, and Friday. C101 Brown Memorial Hall
Office Location: B-181 Brown Memorial Hall
Phone: 823-8867
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Website: http://math.nsu.edu/faculty/mfang/mfang.htm
Office Hours: 9:15-10:15am and 3:30-5:15pm Monday, 9:15-10:45am and 3:30-5:15pm Wednesday, 11:00-12:00pm Thursday, 9:15-10:15am Friday

Note that the Final Examination will be given from **8:00 to 10:00 am on May 4, Tuesday**. The final exam will cover all materials presented in class. Please adjust your plans accordingly.

Text:

1. "A First Course in Differential Equations with Modeling Applications," by Dennis G. Zill, 7nd edition
2. Alternatively, "Introduction to Differential Equations"(online notes http://www.amath.washington.edu/courses/351-autumn-2000/351lecture.pdf), by J. Nathan Kutz.

Calculators: Scientific calculators are recommended.

Course Credits:
3 Credits - 3 Lecture Hours

Course Description: A first course in ordinary differential equations. Topics include first order equations, linear differential equations, variable coefficient equations, and Laplace Transforms. Applications include growth/decay models and the vibrational models.

Prerequisites: Completion of **MATH 252** with a minimum of "C".

Methodology: The course will consist of lectures on relevant topics, followed by class discussion associated with the subject. Assigned homework problems will aid the student in mastering the algebraic concepts presented in class.

General Objectives: The student will be able to:

1. Create and analyze mathematical models based on ordinary differential equations.
2. Determine the type of a given differential equation, determine the existence of a solution and if a solution can be obtained, select the appropriate anaytical techinique for finding the solution;
3. Utliize technology tools to find geometric, graphical and numeric techniques for the analysis of solutions;
4. Solve differential equations using Laplace transforms;
5. Solve Linear Sytems of equations using initial values.

Topics:

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Chapter 1 Preliminary Concepts

Sections:

1.1 Definitions and Terminology

1.2 Initial-value problems

Chapter 2 First-order and simple higher-order differential equations

Sections:

2.2 Separation of variables

2.3 Integrating factors and first-order linear equations

2.4 Exact equations

Chapter 3 Applications of first-order differential equations

Sections:

3.1 Exponential growth and decay

3.2 Population growth and Mixture problems: Law of Mass Action

3.3 Electric networks (optional)

Chapter 4 Linear Differential equations

Sections:

4.1 Second-order linear differential equations

- Linear independence; the Wronkian
- The complete solutions of the Nonhomogeneous and Homogeneous differential equations

4.3 Homogeneous second-order linear differential equations with constant coefficients.

4.4 The Nonhomogeneous equations: Method of undetermined coefficients

4.6 Variation of parameters

4.7 Cauchy-Euler Equations

Chapter 5 Application of second-order equations

Sections:

5.1 Spring/Mass systems

- Free undamped motion
- Free damped motion
- Driven motion

Chapter 7 The Laplace Transform

Sections:

7.1 Definition of the Laplace Transform

7.2 Inverse Laplace transforms and Properties of Laplace Transforms

- Laplace transforms solutions of initial-value problems

7.3 Translation Theorems

Chapter 8 Systems of Linear First-order Differential equations (if time permits)

Sections:

8.1 Preliminary theory

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Course Requirements: Each student must:

1. Attend lectures/demonstrations as I may have you work on problems that are handed in *class*. These problems may be **collected and graded** as the bonus part of homework. If you are absent, you will not have the opportunity to complete the problems. Therefore, attendance is very important to your success in this course. There are other reasons for attending class. For example, my exam questions will (for the most part) reflect the examples that I complete in class.
2. Complete assignments as scheduled by the instructor;
3. Read textbook.

Exams: There will be 2 50-minute exams on nonoverlapping units of the course and a comprehensive final. I will announce an exam about a week in advance in class. For all exams, everyone must bring a pencil and a working calculator.

Grading Policy:

Midterm exams	2 x 100 points
Final exam	200 points
Homework	100 points (plus bonus)
Total	500 points

The following grades are guaranteed if you earn the corresponding percentage of the total points by the end of the semester:

90-100%	87-89%	84-86%	80-83%	77-79%	74-76%
A	A-	B+	B	B-	C+
70-73%	67-69%	64-66%	60-63%	57-59%	Below 56%
C	C-	D+	D	D-	F

Academic Integrity Policies: You are expected and encouraged to discuss problems with others; students often learn best from other students. However, the work you turn in should be completely your own. **Cheating during an exam will be penalized by disciplinary referral and grade penalty for all involved parties.**