College of Arts and Sciences
Department of Mathematics and Statistics

MTH 205 Course Policy and Syllabus – Spring 2011

Instructor Information

Instructor	Office Hours	Room	Ext.	E-mail
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Course Description (catalog):
Covers mathematical formulation of ordinary differential equations, methods of solution and applications of first order and second order differential equations, power series solutions, solutions by Laplace transforms and solutions of first order linear systems.

Prerequisite(s): MTH 104 (Calculus II).

Textbook(s) and/or Other Required Materials:
Primary: Zill D.G., A First Course in Differential Equations with Modeling Applications, 9th Edition, 2009, U.S.A.

Some old quizzes and exams will be posted soon on I-LEARN. Also more quizzes, exams , and course material can be found on my personal webpage www.ayman-badawi.com

Course Objectives: This course is designed to help the student:

- Classify a given differential equation and check the existence of a unique solution of Initial Value Problems (IVP).
- Solve different types of first-order differential equations.
- Utilize different techniques to solve higher order differential equations.
- Solve appropriate applied problems in engineering and sciences as first-order or higher order differential equations.
- Find power series solutions of linear differential equations.
- Use the Laplace transform to solve differential equations.
- Solve systems of linear first-order differential equations.

Course Outcomes: This course requires the student to demonstrate the following:

1. Classify a given differential equation as ordinary or partial, and determine its order and whether or not it is linear.

2. Use the existence and uniqueness theorem to ensure the existence of a unique solution for a given IVP.
3. Solve first-order linear ordinary differential equations.
4. Formulate and solve appropriate applied problems involving exponential growth/decay and Newton's law of cooling and series circuits and other engineering applications.
5. Use reduction of order to find a second linearly independent solution for a homogenous differential equation, given one solution.
6. Find real valued linearly dependent solutions to homogenous ordinary differential equations with constant coefficients.
7. Apply variation of parameters and method of undetermined coefficients to find a particular solution.
8. Solve applied problems from electrical and mechanical engineering as second order differential equations.
9. Obtain power-series solutions to certain differential equations with variable coefficients.
10. Recognize Cauchy-Euler ordinary differential equations and find there general solution.
11. Use the Laplace transform to solve a given Initial-Value problem.
12. Use the convolution theorem to find the inverse transform of the product of two known transforms.
13. Solve systems of linear differential equations by Laplace Transform and eigenvalue methods.

Topics Covered and Schedule in Weeks:

Introduction to Differential Equations	1
First-Order Differential Equations	2
Modeling with First-Order Differential Equations	1
Higher-Order Differential Equations	3
Modeling with Higher-Order Differential Equations	2
Series Solutions of Linear Equations	1
The Laplace Transform	3
Systems of Linear First-Order Differential Equations	1
Review and evaluations	2

Grading	%	Date and Time	Topics
Quizzes and/or Homework	**20%**	TBA	TBA
Test 1	**45%**	Wed (In CLASS), April 6	TBA
Test 2		Monday (In CLASS), May 23	TBA
Final Exam	**35%**	TBA	Comprehensive

Remarks and Rules

1. **Missing quizzes or exams:** Quizzes cannot be made up.

2. **Academic integrity:** You are expected to submit your own work. Copying, cheating or plagiarism, if detected, will result in a WF grade in the course **for all who are involved** (i.e. it does not matter, if somebody copied your homework, project etc., you are guilty as well).

3. **Getting Help:** Students are encouraged to consult their instructor during his office hours or by appointment.

4. **The Math Learning Center (MLC)** located in **NAB239A** provides **free tutoring services by appointment** to all students who experience difficulties with their MTH 205 course. For any question, concern or appointment, please send an e-mail to cas-mlc@aus.edu. **Note: No tutoring is available during final exam week or the two first weeks of the term.**

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Math 205 Suggested Problems

TEXT: *A First Course in Differential Equations with Modeling Application, by Dennis G. Zill, 9th Edition.*

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2.1	41	1, 9, 21, 22, 25, 27
2.2	50	3, 6, 7, 8, 13, 14, 17, 25, 27, 30(a), 32(a)
2.3	60	5, 9, 12, 13, 17, 23, 24, 25, 28, 29, 31
2.4	68	2, 3, 6, 8, 12, 16, 24, 32, 35, 37
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4.1	128	1, 3, 15, 17, 19, 23, 26, 31
4.2	132	2, 3, 9, 11, 17
4.3	138	3, 5, 11, 15, 16, 22, 23, 24, 31, 33
4.4	148	1, 5, 8, 11, 13, 15, 19, 20, 24, 26, 29, 32
4.6	161	1, 3, 9, 15, 19
4.7	168	1, 3, 4, 5, 6, 11, 14, 15, 17, 19, 29
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7.2	269	2, 3, 7, 9, 11, 15, 19, 24, 33, 34, 36, 39
7.3	278	1, 3, 6, 7, 15, 22, 23, 26, 29, 37, 39, 43, 45, 47, 55, 63, 65
7.4	289	1, 5, 7, 8, 11, 23, 25, 27, 29, 37, 39, 41, 45, 49, 51
7.5	295	1, 3, 6, 10
7.6	299	1, 3, 6, 7, 9, 12
8.1	310	1, 5, 7, 9, 11, 18, 22
8.2	324	1, 3, 5, 7, 11, 13