

HENRY FORD COMMUNITY COLLEGE
MATHEMATICS DIVISION COURSE SYLLABUS

MATH 289-70: Differential Equations (4 cr.)

T R 5:25–7:15 PM in L-229

Fall 2009

INSTRUCTOR: Scott Barnett

CONTACT INFORMATION:

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Telephone: (313) 845-6496 [VOICE]; (313) 317-4089 [FAX]
Office: A-224 (in the Learning Technology Center)
Office Hours: A schedule is photocopied onto the back of the syllabus.

Learning Lab computer access: 8:00a – 8:40p MTWR; 8:00a – 4:30p F; 9:40a – 1:40p Sat

Media Center computer access: 7:30a – 9:00p MTWR; 7:30a – 4:30p F; 9:00a – 5:00p Sat; 1:00 – 6:00p Sun

CATALOG DESCRIPTION: This course provides an introduction to ordinary differential equations by means of numerical, graphical, and algebraic analysis. Topics covered include first-order differential equations, second- and higher-order differential equations, methods for nonhomogeneous second-order equations, series solutions, systems of first-order equations, and Laplace transforms. Various applications are covered throughout the course.

PREREQUISITE: A grade of C or better in MATH 280, or a grade of C or better in MATH 183 and concurrent enrollment in MATH 280.

COURSE GOALS:

1. To provide an introduction to the nature and significance of differential equations for students of engineering, mathematics, and science.
2. To demonstrate various applications of differential equations to problems from the physical sciences and engineering.
3. To provide methods for solving differential equations that have proved useful in a wide variety of applications.
4. To present an exposition of differential equations which incorporates graphical, numerical, and algebraic analysis, without undue emphasis on theoretical abstraction or routine mechanical manipulation.
5. To use technology to graph solutions of ODEs and to do explorations and projects involving ODEs.

MAJOR CORE COURSE OBJECTIVES:

Upon successful completion of this course students should be able to:

1. Recognize common forms of differential equations (such as first-order separable, exact, homogeneous, first-order linear, and linear with constant coefficients) and know which methods to apply. Utilize these methods to obtain solutions subject to possible initial or boundary-value conditions.*
2. Use technology in order to develop calculus-based graphical methods as well as numerical methods to verify explicit solutions and to obtain partial or approximate solutions to problems that cannot be solved by explicit methods. Recognize the limitations of such methods.*
3. Solve and analyze simple systems of differential equations and use Laplace transforms to solve both single equations and systems of equations.
4. Use variation of parameters and series to solve linear differential equations with non-constant coefficients. Use series methods and successive approximations to obtain numerical results.
5. Apply these techniques to problems in the physical sciences. This will consist of developing models of phenomena in terms of differential equations, solving these equations utilizing numerical, graphical, and/or algebraic methods, and interpreting the results in light of the original problem.*

*=fulfills HFCC General Education Outcome for critical thinking and problem solving

TEXTBOOK AND MATERIALS: **Required:** Fundamentals of Differential Equations, 7th ed., by Nagle, Saff, and Snider
TI-83 or TI-83/84 Plus Graphing Calculator
Optional: Student's Solutions Manual, 7th ed., by Maymeskul

****TENTATIVE** INSTRUCTIONAL PLAN:**

Chapter 1	Introduction	Sections 1.1 – 1.4
Chapter 2	First-Order Differential Equations	Sections 2.1 – 2.4; 2.6
TEST ONE		Tuesday, September 22, 2009
Chapter 3	Models/Num. Methods (1 st Order DEs)	Sections 3.1 – 3.4
Chapter 4	Linear Second-Order Equations	Sections 4.1 – 4.5
TEST TWO		Thursday, October 15, 2009
Chapter 4	Linear Second-Order Equations	Sections 4.6, 4.7, 4.9, and 4.10
Chapter 6	Higher-Order Linear DEs	Sections 6.1 and 6.2
Chapter 7	Laplace Transforms	Sections 7.1 – 7.4
TEST THREE		Tuesday, November 10, 2009
Chapter 7	Laplace Transforms	Sections 7.5 – 7.7
Chapter 5	Introduction to Systems	Section 5.2
Chapter 7	Laplace Transforms	Section 7.9
Chapter 8	Series Solutions of DEs	Sections 8.1 – 8.3
TEST FOUR		Thursday, December 10, 2009
COMPREHENSIVE FINAL EXAM		Tuesday, December 15, 2009 (5:30 – 7:15 PM)

Class will not meet Thursday, November 12 (I'll be away at a conference) and Thursday, November 26 (Thanksgiving).

INSTRUCTIONAL POLICIES:

Homework: Problem sets will be given throughout the term. In general, these will be due at the beginning of class one or more class days following the sessions during which they are assigned. Points awarded, while largely determined by the content of the work, may also be affected by presentation (legibility, following directions, turning in paper without spiral edges remaining, etc.). Problem sets will be scaled to be worth a total of 50 points at the end of the term. **Work submitted late during the class session in which it is due may not be accepted at all or may be accepted with a scoring penalty. In general, problem sets will not be accepted after the class session during which they are due. The instructor is not responsible for computer or other equipment failures that prevent a student from submitting an assignment on time. Students should feel free to request phone or e-mail confirmation of the instructor's receipt of assignments submitted electronically.**

Suggested homework problems will be assigned during most class meetings. These should be done by the following class meeting, but they are not to be turned in, and they are not graded. Students who don't do the homework, however, do not usually do well on the exams. On a typical day, no more than a few minutes will be spent going over homework questions in class. **Students whose questions are not answered in class should feel free to take advantage of office hours.**

Tests: There will be four 100-point tests given during the regular semester. In addition, there will be a 150-point cumulative final exam. Although in rare circumstances it may be possible to take an exam early, there will, in general, be no make-ups given. The final exam score may be scaled to replace up to one missed or low test score provided that the student's homework average at the end of the semester is at least 80%.

Attendance: Attendance is taken daily. While no points are directly deducted if a student misses class, please note the above comments about late work.

Classroom Decorum: Cell phones and other noise-making electronic devices are disruptive and should be put into "silent" mode or turned off during class. Talking with other students, even about mathematics, is disruptive to the class during lectures. Sleeping, doing work for other classes, eating more than a small snack, and leaving the room without a serious reason are examples of inappropriate classroom behaviors that detract from the learning environment.

Grading Procedures:

- | | | |
|----|------------------------------------|-------------------|
| 1. | Homework | 50 points |
| 2. | 4 exams @ 100 points each | 400 points |
| 3. | Cumulative final exam @ 150 points | <u>150 points</u> |
| | | 600 points |

Let x be the number of points earned.

$540 \leq x$	A grade	$360 \leq x < 420$	D grade
$480 \leq x < 540$	B grade	$0 \leq x < 360$	E grade
$420 \leq x < 480$	C grade		

All material submitted for the course will be returned to the students except for the final exam.

Drop Policy:

College Policy: Students may officially drop a class and receive a *DR* grade anytime up until the end of the day Thursday, November 12, 2009. If a student stops attending without officially withdrawing, the instructor may record either an *E* or a *DR* grade.

Instructor Policy: After November 12, 2009, a student may receive a *DR* grade if he or she requests the grade from the instructor IN WRITING, IN PERSON, using the form provided by the instructor, anytime during office hours on or before Monday, December 14, 2009. Both the instructor and the student will retain signed copies of the form used. Note that drops are **NOT** accepted verbally, by e-mail, voice mail, etc.

Academic Dishonesty:

College Board of Trustees Policy #8500 (adopted 3/17/97):

"...It shall be the policy of the College that determination of the fact of academic dishonesty by a student shall be a matter of individual judgment by the instructor. The instructor may administer a penalty up to, and including, failure in the particular course..."

Instructor Policy:

Academic dishonesty of any form will result in a penalty up to, and including, immediate failure in the course and the recording of a final grade of *E* in the course. The penalty levied for a particular occurrence of academic dishonesty is at the sole discretion of the instructor. **To help ensure the integrity of test scores, students are not allowed to leave the classroom during tests, and students are not allowed to share calculators during tests.**

MATHEMATICS DIVISION POLICY ON CUT-OFF DATE FOR STUDENT DROP-DOWNS

"Registered students may only drop-down (move-up) to another math class within the first **three** weeks of the Fall and Winter semesters. In order to drop-down (move-up), a student must:

- 1) Obtain the written permission of his/her current instructor stating that the student was misplaced.
- 2) See the Mathematics Associate Dean for assistance in finding open sections.
- 3) Officially file an Add-Drop form at the Registration office.