

Math 251
Differential Equations
Spring 2013
CRN: 23419
T-Th 2:00-3:15
FJD

Instructor: Dr. Christopher Mouron

Office: 322 Ohlendorf Hall

Office Hours: MWF 2:30-3:30 or by appointment. Pop-ins are welcomed

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Text: Differential Equations, 4rd ed. By Blanchard, Devaney and Hall. **You will need the DE TOOLS access code—this will be used for assignments.**

Course Description: The theory, methods, and applications of ordinary differential equations. Topics include existence, uniqueness and other properties of solutions, linear equations, power series and Laplace transform methods, systems of linear equations, and qualitative analysis

Tentative Course Content:

- 1) First-order Differential Equations
 - Modeling
 - Analytic Techniques
 - Qualitative Techniques
 - Numerical techniques
 - Existence and Uniqueness of Solutions of Initial Value Problems
 - Equilibria and the Phase Line
 - Bifurcations
 - Linear Differential Equations
 - Change of Variables
- 2) First-order Systems
 - Modeling
 - Geometry
 - Analytic methods
 - Numerical Methods
 - Existence and Uniqueness of Solutions
 - Lorentz Equations
- 3) Linear Systems
 - Linearity Principle
 - Straight-line Solutions
 - Phase Portraits for systems with Real Eigenvalues
 - Complex Eigenvalues
 - Repeated and zero Eigenvalues
 - Second-order Linear equations
 - Trace-determinant plane

Linear Systems in 3 dimensions

- 4) Forcing and Resonance
 - Harmonic Oscillators
 - Sinusoidal Forcing
 - Undamped Forcing and Resonance
 - Amplitude and Phase of the Steady State
- 5) Nonlinear Systems
 - Equilibrium Point analysis
 - Other Selected Topic on Nonlinear systems

Course Prerequisites: Calculus 2. *You are expected to know how to integrate and differentiate. You probably will want to keep a calculus book handy to review—this is **your** responsibility.*

Attendance Policy: I will follow the College's attendance policy, which can be found on page 71 of the Catalogue. In particular, a student will be given a warning after 4 absences and a written recommendation to the Dean that the student be dropped from the course will be made after 7 absences. In the case of a missed test, the student will be allowed to make-up the test only if both of the following conditions are satisfied:

- 1) I am contacted before the test is given (at least 1 week in the case of absence due to the attendance of an official school function.)
- 2) I am given proper documentation.

Finally, the student is responsible for all material and notes due to an absence. Get the notes from another student. Come to my office for any materials handed out in class.

Homework, Labs and Quizzes (15%): Mathematics is not a spectator sport. In order to learn the techniques and concepts, the student must work problems outside of class. The student is expected to spend at least 3 hours outside of class for every hour spent in class.

- 1) Practice exercises. These are problems that the student should do before the next class meeting. Students are expected to keep a notebook containing these exercises. If a student has difficulty with an exercise, the student may ask me to do it in class (provided time allows) or in my office. Students may work together on these exercises. Students are to keep a notebook that contains all of their practice exercises. If a student gets below a 75 on his/her test, then that student is required to show me their notebook before or after each class until their test scores improve.
- 2) Graded exercises. These problems will be collected usually once a week. Due to the fact that I have 40 students, it is imperative that the work turned in is neat and organized. The student will be graded on correctness of the work. Also the student is required to show all work leading to an answer. The students may not work together on these specific problems or receive any outside help except from me or the text. **Copying homework will be considered an honor violation and students suspected of copying homework will be referred to the Honor Council.**

- 3) Pop quizzes. If it is evident to the instructor that the students are not keeping up with the homework, a pop quiz may be given.

Also, the student is expected to “pre-read” the text before the lecture. This is an excellent way for the student to familiarize him/herself with the material covered and will aid the student in following the lectures.

Written Discovery Projects (10%): There will be discovery projects that will consist of longer, more involved applications of differential equations. These projects must be typed and will be graded on correctness of the mathematics and written exposition.

Late homework and projects will not be accepted. You will have plenty of time to complete assignments to turn in. If you are sick, have a roommate, classmate or friend turn in your homework for you. If they can get it to me before noon, it will be accepted. If you plan to miss class for other reasons, turn in the homework early or have a classmate turn it in during class.

Tests (48%): There will be 3 tests throughout the semester. Unless otherwise notified, the test will be closed book and notes. Tentative test dates are:

- 1) February 12, 7:30-8:50
- 2) March 26, normal class time
- 3) April 17, 7:30-8:50

Final Exam (27%): The final exam will be cumulative. Unless otherwise notified, the exam will be closed book and notes. The final exam will be Wednesday, May 1 at 5:30 pm.

Grades: Grades will be earned for the following percentages:

<i>A</i>	Score $\geq 93\%$	<i>C</i>	$73\% \leq \text{Score} < 77\%$
<i>A-</i>	$90\% \leq \text{Score} < 93\%$	<i>C-</i>	$70\% \leq \text{Score} < 73\%$
<i>B+</i>	$87\% \leq \text{Score} < 90\%$	<i>D+</i>	$67\% \leq \text{Score} < 70\%$
<i>B</i>	$83\% \leq \text{Score} < 87\%$	<i>D</i>	$63\% \leq \text{Score} < 67\%$
<i>B-</i>	$80\% \leq \text{Score} < 83\%$	<i>D-</i>	$60\% \leq \text{Score} < 63\%$
<i>C+</i>	$77\% \leq \text{Score} < 80\%$	<i>F</i>	Score $< 60\%$

Honor Code: The student is expected to conduct him or herself within the guidelines of the College’s Honor Code. If you have any questions about what is or not allowed, please ask.

If you have a documented disability and wish to receive academic accommodations, please contact myself and the Office of Student Disability Services as soon as possible.