MAP 2302 Differential Equations Course Syllabus

Differential Equations: MAP 2302 Ref. No. 322771
Instructor: Lawrence Hawkins
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Term: Fall 2006 (20071)

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Introduction:

Purpose: Upon successful completion of this course, the student should be able to set up and solve the ordinary differential equations that model typical applied problems occurring in physics, chemistry, biology, economics, and the social sciences.

Topics: These include the classification, solution and application of differential equations, including numerical methods, Laplace transforms, linear systems, and series solutions.

Prerequisites: MAC 2312 with a grade of "C" or higher, or permission of the Mathematics Department.

Co-Requisites: None

Learning Outcomes:

Upon the conclusion of this course the student should acquire adequate theoretical understanding and an applied working knowledge of the following topics:
1.1 Identify and classify differential equations.
1.2 Derive differential equations corresponding to families of curves.
2.1 Sketch the isoclines of an equation.
2.2 Solve equations by the method of separation of variables.
2.3 Solve nonlinear equations with homogeneous coefficients.
2.4 Solve exact equations in general.
2.5 Determine the solution of the general first order linear equation.
2.6 Find integrating factors.
2.7 Solve Bernoulli’s equation.
2.8 Solve equations in terms of nonelementary integrals.
2.9 Expand nonelementary integrals in power series.
3.1 Derive the escape velocity from a planet.
3.2 Solve problems using Newton's law of cooling.
3.3 Solve problems involving rates of growth, decay, and chemical reaction.
4.1 Determine if functions are independent.
4.2 Evaluate the Wronskian of a set of functions.
4.3 Find the general solution of a linear nonhomogeneous equation.
4.4 Write an equation in operator form.
4.5 Perform algebraic operations on operator expressions.
5.1 Solve equations whose auxiliary equation has distinct roots.
5.2 Solve equations whose auxiliary equation has repeated roots.
5.3 Solve equations whose auxiliary equation has imaginary roots.
6.1 Construct differential equations from specified solutions.
6.2 Solve second order differential equations using the method of undetermined coefficients.
6.3 Reduce the order of a differential equation.
6.4 Find the general solution of a nonhomogeneous equation using the method of variation of parameters.
7.1 Find the Laplace transform of elementary functions and their derivatives.
7.2 Solve differential equations using the Laplace transform.
7.3 Use the convolution integral to find inverse transforms.
7.4 Solve initial value problems.
8.1 Set up systems of equations from given situations.
8.2 Use elementary elimination techniques to solve systems of equations.
9.1 Solve nonsingular differential equations by the power series method.
9.2 Identify singular points and ordinary points.
9.3 Identify the interval of convergence of a power series solution.
10.1 Find the indicial equation of a differential equation.
10.2 Determine solutions of differential equations for various values of the roots of the indicial equation.
10.3 Determine the validity of solutions.

**Emergency Contact Number:** Call 954-475-4900 for any possible class cancellations due to severe weather, etc.
Hawkins’ Policy on Academic Dishonesty

ZERO TOLERANCE FOR ANY VIOLATIONS OF THE BCC STUDENT CODE OF CONDUCT.
Mathematics Department policy mandates that any student caught cheating will receive an automatic grade of F for the course and be subject to possible further BCC penalties. See the BCC Handbook for details.

Course Materials Needed

1. **Notebook required**, containing all homework (50%), class lectures and discussion (25%), quizzes (20%), and exam corrections (5%). Quizzes may be given at any time in class and will consist of even numbered problems selected from the course text illustrating the day’s assigned material and lecture. These quizzes will be graded with either (\(\checkmark\) = correct) or (\(\times\) = incorrect)) as the student leaves the class. The notebook will be graded four times, during each of the four exams, and up to 10 points will be added to each of the pre-final exams in the Final Grade Average.


3. **Time to work on the material** each and every day! Successful completion of this class is highly correlated to the analytic, computational, and problem-solving skills developed by actual problem solution using proper (long term memory inducing) study techniques. Cramming for this course is ill advised: 8 hours on a Sunday won’t make up for not looking at the material throughout the week. You need to plan on spending one to four hours every day on this material, reviewing the old ideas, working with the new problems.

**Homework Assignments**: At the beginning of each chapter, selected problems will be assigned from the above sections of the syllabus.

**Grading Methodology**

In order to monitor the progress of the students and to give a numerical evaluation of their performance, letter grades are assigned at the end of the term according to the following weighted averages; Notebook Bonus worth up to 10 points added to each exam, Four Exams, each exam worth (including bonuses) up to 100 points, a Portfolio Project worth 100 points, A Cumulative Final Exam worth up to 200 points.

\[
\text{FINAL GRADE AVERAGE} = \frac{[2*\text{Final} + \text{Four pre-final Exams} + \text{Portfolio}]}{7}
\]

**Grade average and final course grade**:

\[
100 \geq A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F \geq 00
\]
The Instructor reserves the right to curve a student’s course grade distribution to reflect significant student progress, end-of-course achievement, and total course mastery as demonstrated by exceptional achievement on the Final Exam, by replacing the lowest pre-final exam with the final exam score in the FINAL GRADE AVERAGE.

**Special Needs Students:** Contact me personally and/or the BCC Office for Student Success in Building 62.

**Missed Exam Policy:** No make up exams will be given—the first missed exam will be replaced with the final exam score.

**Extra Help:** BCC LEARNING RESOURCESCENTER (located in the Library, Bld. 62) provides free help for students. While help is occasionally available on a walk-in basis, usually students have to make an appointment.

**Withdrawal Date, Credit to Audit change deadline:** Please see the Academic Calendar at [http://www.broward.edu/](http://www.broward.edu/). October 26, 2006

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