DIFFERENTIAL EQUATIONS

MATH 3410.002

FALL 2016

Instructor: Dr. J. Iaia *Class Meetings*: MWF 10:00-10:50 SAGE 231

Text: Boyce, DuPrima, *Elem. Diff. Eqns. and Bdy. Value Probs.*, 10th ed.

Office: GAB 420 *Office Hours*: MWF 11-1 or by appointment

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A copy of the syllabus and homework problems can be found on Blackboard.

GRADING POLICY

Exam 1	20%	*Sept.* 23
Exam 2	20%	*Oct.* 21
Exam 3	20%	*Nov.* 18
Homework	20%	*weekly*
Final Exam	20%	*Dec* 10, 8-10 am

A 90-, B 80-89, C 70-79, D 60-69, F -59

EXAMS: Exams **MUST** be taken on the dates listed above and neither earlier nor later. Exceptions will be considered *only* if one's circumstances are *absolutely dire* or one is a student with a disability. In either case, one should provide **WRITTEN DOCUMENTATION** certifying one's absence without which the student may receive a zero or have substantial points deducted from their exam grade.

HOMEWORK: Homework will be assigned each class and collected weekly. **SEVERAL** of the homework problems will be **GRADED**. Students may work together on the homework if they so desire. Homework problems should be written out **NEATLY** and **CLEARLY**. Students are expected to **SHOW THEIR WORK** and points may be deducted for correct answers which do not show adequate work.

ATTENDANCE: Students **ARE RESPONSIBLE** for **ALL** work assigned and announcements made during class whether or not they are present.

CODE OF CONDUCT, CHEATING: Students are expected to be *respectful of others* at all times. This includes keeping talk and other noise to a minimum while a lecture is in progress or an exam is being taken. Any student being disruptive may be dismissed from the class meeting. **CHEATING** will **NOT** be tolerated and anyone found guilty of cheating is subject to **FAILURE** for the semester.

The **Student Evaluation of Teaching Effectiveness (SETE)** is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in feedback from students, as I work to continually improve my teaching. I consider the SETE to be an important part of your participation in this class.

STUDENTS WITH DISABILITIES: It is the responsibility of students with disabilities to provide the instructor with appropriate documentation from the Dean of Students Office.

Course Description

Differential equations has applications in many of the other sciences. Physics, chemistry, and biology all use differential equations to describe various phenomena - the motion of the planets, chemical reactions, the spread of disease, interactions between species, etc. Therefore a good understanding of differential equations is essential for anyone interested in these areas. Isaac Newton originally invented calculus and differential equations to solve various problems in physics and in this course we will study a number of them including separable equations, linear equations, linear equations with constant coefficients, and others. We will study power series solutions and also linear systems as well as using the Laplace transform to study differential equations.

Course Objectives

By the end of this course students will be able solve separable, linear first order equations, and homogeneous equations. They will also be able to solve second order linear equations with constant coefficients as well as know how to use the method of undetermined coefficients and the variation of parameters technique. In addition, students will know how to find a power series of a linear differential equation as well as how to solve first order linear systems with constant coefficients. Students will also learn how to calculate and use the Laplace transform to study differential equations.

Course Outline

Meeting 1 - direction fields

Meeting 2 - separable equations

Meeting 3 - first order linear equations

Meeting 4 - first order homogeneous equations

Meeting 5 - exact equations

Meeting 6 - integrating factors

Meeting 7 - reduction of some second order equations to first order equations

Meeting 8 - Bernoulli's equation

Meeting 9 - math modeling with differential equations

Meeting 10 - second order linear equations with constant coefficients

Meeting 11 - review for exam 1

Meeting 12 - exam 1

Meeting 13 - use of one solution to find another solution for the second order linear equation

Meeting 14 - linear independence and dependence of solutions

Meeting 15 - the Wronskian and linear independence of solutions

Meeting 16 - more on the Wronskian

Meeting 17 - method of undetermined coefficients

Meeting 18 - more on the method of undetermined coefficients

Meeting 19 - variation of parameters

Meeting 20 - more on variation of parameters

Meeting 21 - higher order linear equations

Meeting 22 - more on higher order linear equations

Meeting 23 - review for exam 2

Meeting 24 - exam 2

Meeting 25 - power series solutions of second order linear equations

Meeting 26 - more on power series

Meeting 27 - Euler's equation

Meeting 28 - regular singular points and the method of Frobenius

Meeting 29 - more on regular singular points

Meeting 30 - review of eigenvalues and eigenvectors

Meeting 31 - first order linear systems

Meeting 32 - more on first order linear systems

Meeting 33 - more on first order linear systems

Meeting 34 - review for exam 3

Meeting 35 - exam 3

Meeting 36 - the Laplace transform

Meeting 37 - using the Laplace transform to solve linear differential equations

Meeting 38 - more on the Laplace transform

Meeting 39 - more on the Laplace transform

Meeting 40 - review for final exam

Meeting 41 - review for final exam

Meeting 42 - final exam