

**COLLIN COUNTY COMMUNITY COLLEGE
COURSE SYLLABUS**

COURSE NUMBER: Math 2320
COURSE TITLE: Differential Equations
CREDIT HOURS: 3 **LECTURE HOURS:** 3 **LAB HOURS:** 0 **CLN/REC HOURS:** 0
PREREQUISITE: Math 2414 or Math 2419
COREQUISITE: None

TEXTBOOK:

A First Course in Differential Equations, 9th Ed., Dennis G. Zill, Brookes/Cole, 2009.

SUPPLIES: Graphing calculator required

COURSE DESCRIPTION:

Differential equations including systems of equations, linear equations, separation of variables, series solutions, uniqueness of solutions, initial value problems, transform methods, and singular points.

COURSE MEASURABLE LEARNING OBJECTIVES:

Upon completion of this course the students should be able to do the following:

1. Solve first order differential equations.
2. Solve higher order differential equations.
3. Solve initial value problems using Laplace Transforms.
4. Solve application problems involving differential equations.
5. Approximate solutions to differential equations using numerical methods.
6. Solve systems of differential equations using eigenvalues and eigenvectors.
7. Use power series to solve first and second order differential equations.

COURSE REQUIREMENTS:

Completion of required exams and assignments.

COURS FORMAT:

Lecture and guided practice.

METHOD OF EVALUATION:

A minimum of four written exams and a comprehensive final exam. Homework and/or quizzes may be used in place of one exam or in addition to exams. The weight of each of these components of evaluation will be specified in the individual instructor's addendum to this syllabus. All out-of-class course credit, including take-home exams, home assignments, service-learning, etc. may not exceed 25% of the total course grade; thus, at least 75% of a student's grade must consist of exams given in the class or testing center, and no student may retake any of these exams.

ATTENDANCE POLICY:

Attendance is expected of all students. If a student is unable to attend, it is his/her responsibility to contact the instructor to obtain assignments. Please see the schedule of classes for the last day to withdraw.

RELIGIOUS HOLY DAYS:

In accordance with section 51.911 of the Texas Education Code, the college will allow a student who is absent from class for the observance of a religious holy day to take an examination or complete an assignment scheduled for that day within a reasonable time. A copy of the state rules and procedures regarding holy days and the form for notification of absence from each class under this provision are available from the Admissions and Records Office.

COURSE REPEAT POLICY:

All students may repeat this course only once after receiving a grade, including W. For example students who have taken this course twice have to choose a different course to take after two trials.

ADA STATEMENT:

It is the policy of Collin County Community College to provide reasonable and appropriate accommodations for individuals with documented disabilities. This College will adhere to all applicable Federal and State laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS Office (G-200) or 972.881.5898, (TDD 972.881.5950) in a timely manner if he/she desires to arrange for accommodations.

ACADEMIC ETHICS:

The college may initiate disciplinary proceedings against a student accused of scholastic dishonesty. Scholastic dishonesty includes, but is not limited to, statements, acts, or omissions related to applications for enrollment or the award of a degree, and/or the submission of material as one's own work that is not one's own. Scholastic dishonesty may involve one or more of the following acts: cheating, plagiarism, collusion, and/or falsifying academic records.

Cheating is the willful giving or receiving of information in an unauthorized manner during an examination, illicitly obtaining examination questions in advance, using someone else's work for assignments as if it were one's own, copying computer disks or files, and any other dishonest means of attempting to fulfill the requirements of a course.

Plagiarism is the use of an author's words or ideas as if they were one's own without giving credit to the source, including, but not limited to, failure to acknowledge a direct quotation. Contact the Dean of Students at 972.881.5771 for the student disciplinary process and procedures or consult the CCCCD Student Handbook.

SPECIFIC REQUIREMENTS/COURSE CONTENT:

The student will be responsible for knowing all definition and statements of theorems for each section outlined in the following modules.

MODULE 1: INTRODUCTION

The student will be able to:

1. Learn about definition and terminology.
2. Identify Initial value problems.
3. Learn differential equations as Mathematical Models.

MODULE 2: TECHNIQUES OF SOLVING EQUATIONS OF ORDER ONE

The student will be able to learn about:

1. Solution curves without a solution including direction fields and Autonomous First Order DE
2. Solve certain differential equations by separation of variables.
3. Solve linear equations of first-order.
4. Exact equations.

MODULE 3: MODELING WITH FIRST-ORDER DIFFERENTIAL EQUATIONS

The student will learn about:

1. Linear models.
2. Nonlinear models.
3. Application problems related to systems of linear and nonlinear equations.

MODULE 4: DIFFERENTIAL EQUATIONS OF HIGHER ORDER

The student will be able to:

1. Learn preliminary theory of Initial Value Problems, homogeneous equations and non-

- homogeneous equations.
2. Solve linear homogeneous differential equations with constant coefficients.
 3. Obtain the general solution of a non-homogeneous equation by the method of undetermined coefficients.
 4. Use variation of parameters to solve Non-homogeneous equations.
 5. Learn Cauchy-Euler equations and Systems of Linear equations.
 6. Construct a homogeneous equation from a specified solution.
 7. Solve System of Linear Equations by Elimination.

MODULE 5: APPLICATIONS OF LINEAR HIGHER ORDER DIFFERENTIAL EQUATIONS

The student will be able to:

1. Solve problems involving simple harmonic motion.
2. Determine whether a damped vibrating system is over damped, under damped, or critically damped.
3. Solve forced vibration problems.
4. Solve elementary electrical circuits.

MODULE 6: SERIES SOLUTIONS OF LINEAR EQUATIONS

The student will be able to:

1. Find power series solutions to linear differential equations.
2. Find solution about Singular Points

MODULE 7: THE LAPLACE TRANSFORM

The student will be able to:

1. Define the Laplace transform.
2. Find transforms and inverse transform of derivatives and derivatives of transforms.
3. Learn about translation on the s-axis and t-axis.
4. Solve problems involving the gamma function and periodic functions.

MODULE 8: SYSTEM OF LINEAR FIRST-ORDER DIFFERENTIAL EQUATIONS

The student will be able to:

1. Learn preliminary theory of Homogenous Linear Systems.
2. Solve systems by variation of parameters method.

MODULE 9: NUMERICAL METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS

The student will be able to:

1. Solve ordinary differential equations by Euler's method.