

NORMANDALE COMMUNITY COLLEGE

SUMMER 2021, COURSE SYLLABUS

MATH 2520-01 DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA (*Online*)

I. IDENTIFYING INFORMATION

- A. Mathematics 2520 - 01: Differential Equations and Linear Algebra (Online)
- B. Instructor: Ghidei Zedingle
- C. Summer Semester, 2021
- D. 5 credits
- E. Prerequisite: Math 1520 with a grade of C or higher, or approved equivalent preparation.
- F. Office:
- G. Office hours: MWF 9:00 - 10:00am, TTh 5:00 – 6:00; other times by appointment. (**Using zoom meeting**)
- H. Office phone: (952) 358- 8362
- I. Office e-mail: ghidei.zedingle@normandale.edu
- J. Normandale fax number: (952) 358 – 8101

II. COURSE DESCRIPTION

Matrices and systems, vector spaces, subspaces, linear independence, basis, dimension, linear transformation, eigenvectors; first and second order differential equations, Euler’s Method, phase plane analysis of linear and nonlinear systems, extensive modeling. Laplace transforms and power series solution.

III. LEARNING OUTCOMES

Upon successful completion of Math2520, students will be able to:

- Classify and solve first order differential equations of various types: separable, exact and linear including initial-value problems.
- Apply existence and uniqueness theorems.
- Use direct field to illustrate solutions of differential equations.
- Approximate solutions to first order equation using Euler’s method.
- Compute algebraically with matrices, products, inverses and determinants.
- Apply matrix reduction method to solve and describe solution sets of linear systems.
- Describe the structure and characteristics of vector spaces, subspaces and linear transformation between vector spaces.
- Compute eigenvalues and eigenvectors.
- Solve nth order linear differential equations with constant coefficients using undetermined coefficients and variation of parameter, including initial and boundary value problems.
- Analyze linear and nonlinear systems of differential equations using eigenvalue and phase plane methods.
- Model a variety of applied situations with differential equations and dynamical systems (e.g. harmonic oscillator and predatory-prey).
- Solve problems using Laplace transforms and power series solutions.

IV **MAJOR TOPICS: (Based on Lecture notes)**

- Chapter 1: FIRST ORDER DIFFERENTIAL EQUATIONS
- Chapter 2: MATRICES AND SYSTEMS OF LINEAR EQUATIONS
- Chapter 3: DETERMINANTS
- Chapter 4: VECTOR SPACES
- Chapter 5: LINEAR TRANSFORMATION
- Chapter 6: EIGENVALUES AND EIGENVECTORS
- Chapter 7: LINEAR DIFFERENTIAL EQUATIONS OF ORDER n
- Chapter 8: SYSTEMS OF DIFFERENTIAL EQUATIONS
- Chapter 9: THE LAPLACE TRANSFORM AND SOME ELEMENTARY APPLICATIONS
- Chapter 10: SERIES SOLUTIONS TO LINEAR DIFFERENTIAL EQUATIONS

V **BREAKDOWN OF SECTIONS BY WEEK**

Breakdown of topics by week will be posted as reading material on D2L content area. Lecture notes will also be posted on D2L in the content area. Because some chapters, some sections from chapters and even topics from sections are omitted, I recommend that you start reading from the lecture notes and go to the text book for more examples and reading on the subject matter.

VI. **MATERIALS NEEDED**

- A. Text book: Differential Equations and Linear Algebra by Goode and Annin, 4th edition, published by Pearson.
- B. Graphic Calculator(recommended): TI-83/TI-84/TI-89.

VII. **EVALUATION**

A. Homework (25%)

There will be weekly assignment questions that will be posted on D2L content area. All home-works will be done in paper and pencil (pen) and will be submitted on D2L under Assessment -> Assignment. Due dates will be indicated with the questions. Check for the due date ahead of time. I didn't know (or I forgot) is not an excuse for not completing the assignment on time. You can review your work and any comments after it is corrected. Lowest one assignment will be dropped.

B. Quizzes (20%)

There will be three quizzes as indicated in the table below. Quizzes will be posted on D2L content area. Same as with the homework, quizzes will be done in paper and pencil and will be submitted on D2L. Due dates will be indicated with the questions. Check for the due date ahead of time. **I didn't know (or I forgot)** is not an excuse for not completing the quizzes on time. You can review your work and any comments after it is corrected.

Week 2, 06/11	Q1
Week 4, 06/25	Q2
Week 6, 07/9	Q3

C. Exams. (55%)

Two exams will be given. One mid semester and one final exam. Mid-semester exam is comprehensive and will be on **June 18, 2021**. Final exam will be comprehensive and will take place on **July 16, 2021**.

D. Discussion Board

Discussion board will be set up on D2L. You can post questions or respond to questions posted on the discussion board. The questions can be on the course material and use of technology (TI-83/84, Maple etc.). If you have personal or grade related questions the best way will be to use e-mail and make sure to use your Normandale e-mail account.

VIII. Technology

The course being mostly on line, you will depend heavily on technology and in particular in computer. You are expected to have your own computer or have continuous access to computer that works effectively. Assignments posted for 4 – 5 days so that you will have time to check your equipment and to finish them on time. If for some reason it didn't work, you will have time to fix it or to look for an alternative, such as public library to complete it on time. Have a backup plan. Normandale's Computer Center is also open.

VIII. COURSE POLICIES

A. Grading. The final course grade will be based on the total accrued in the course as follows:

Homework	25%
Quiz	20%
Mid Exams	25%
<u>Final exam</u>	<u>30%</u>
Total	100%

The final course grade will be based on these percentages of the total points:

90% - 100%	= A
80% - 89.9%	= B
70% - 79.9%	= C
60% - 69.9%	= D
Below 60%	= F .

Incomplete (I) grades generally will not be given. They are reserved for students who have successfully completed a great majority of course work, but due to extreme circumstances cannot complete some essential component, e.g. final exam and the student has a passing grade. Withdrawing from class (W) is a student-initiated action Last date of withdrawal is **07/07/2021**. Please talk to your counselor about withdrawing before you take any action to do so. Any student who stops

working on class activity without officially withdrawing will receive an F grade.

- B. Late assignment policy. Each homework has a due date. Check ahead of time. There will be 24 hrs automatic extension of time with a 10% penalty. Any make-up quiz or exam will also be subject to 10% penalty.

VIII. ADDITIONAL HELPS

- A. Communication with instructor through e-mail or zoom meeting during the office hrs or by appointment.
- B. Online tutoring from Normandale.

IX. Disability Services and Accessibility

If you qualify to receive classroom accommodations based on a disability, please contact the Office for students with Disabilities Director, Debbie Tillman, at 952-358-8623 or osd@normandale.edu to discuss how accommodations may be implemented in all of your Normandale classes.