

Instructor: Dr. Talitha Washington
Contact Info: Office: KC 318; Phone: 488-2213; Email: tw65@evansville.edu
Office Hours: MWF 8:15-9, 10-12; Tu 8:15-10 and by appointment
Required Texts: *A First course in Differential Equations*, 8th Edition, Dennis G. Zill
Prerequisite: Mathematics 323 (knowledge of differentiation and integration methods)

Course Description: Covers theory and methods for solving differential equations. Major topics covered in this course include first, second and higher order equations, power series solutions of differential equations, Laplace transforms, systems, nonlinear methods, numerical methods and applications. The style of the course will be skewed towards practical application of the material, and not very theoretical in nature. However, this is a 300-level math class and expects a corresponding level of mathematical rigor and student responsibility.

Course Learning Objectives: It is expected that students will:

- gain factual knowledge about differential equations
- be able to classify as well as acquire methods to solve differential equations
- learn fundamental principles and theory of differential equations
- learn to apply course material to enhance understanding in fields of engineering and science
- develop specific skills and competencies in mathematics through oral and written work

Methods of Instruction: The method of instruction for most classes will be a lecture/discussion. Students are encouraged to participate in class by asking questions, contributing to discussions, and working problems. Outside of class, students are expected to read the text and complete all assigned homework.

Grading: The weights in determining your final grade are as follows:

- 2% – Attendance
- 18% – Quizzes, Fridays throughout the semester
- 18% – Exam 1, Wednesday, February 7
- 18% – Exam 2, Wednesday, March 21
- 18% – Exam 3, Wednesday, April 25
- 26% – Final Exam
 - Section 01: Friday, May 4 at 12:30 p.m.
 - Section 02: Thursday, May 3 at 12:30 p.m.

The usual course grades apply. (ex: $80 \leq x < 83 \rightarrow B^-$, $83 \leq x < 87 \rightarrow B$, $87 \leq x < 90 \rightarrow B^+$) Changes to the Exam dates will be announced in class.

Course requirements and policies:

a. Calculators and Computers: You may use a calculator on all exams and quizzes. Computers and calculators with symbolic algebra capability (e.g. TI-89 or TI-92) **will not** be allowed during exams or quizzes.

b. Attendance: You are expected to attend class on time every day. It is **your** responsibility to sign the attendance sheet each class day. If you miss a day, it is up to **you** (not me, or your classmates) to catch up and learn what you have missed.

c. Homework: The importance of homework cannot be over-stressed: one can only learn mathematics by doing many exercises! Doing homework and writing up the solutions allows you to test yourself to see whether you really understand the material. This also protects you from being "surprised" on the exams. Many questions on the quizzes and exams will be strikingly similar to those given in the homework.

d. Quizzes: A quiz will be given every Friday, except for exam weeks and will consist of two parts: in-class and out-of-class. NO make up quizzes will be given. At the end of the semester, your lowest quiz score will be dropped.

e. Make-ups: Assignments that are to be completed outside of class will **not** be accepted late for any reason. Make-up exams or quizzes will be given only in extreme circumstances that are documented university approved excused absences, and only if I am aware of the circumstances prior to the exam. In particular, make-ups will never be given to accommodate travel plans.

f. Honor Code: It is expected that students are familiar with and will comply with the terms of the University's Academic Honor Code. Collaboration on homework is allowed and encouraged, but giving or receiving help of any kind on exams and in-class quizzes is strictly prohibited.

g. Accessibility: Please let me know immediately if you have a learning or physical disability requiring accommodation. For more information, contact the Office of Counseling and Health Education at 488-2663.

Schedule

First Order Differential Equations

Definitions and terminology (1.1)

Quantitative technique (2.2-2.5)

The existence-uniqueness theorem (1.2)

Qualitative technique (2.1)

Higher Order Differential Equations

Algebraic properties of solutions (4.1.1, 4.1.2)

Homogeneous equation (4.2, 4.3)

Nonhomogeneous equation (4.1.3, 4.4, 4.6, 4.7)

Series Solutions About an Ordinary Point

Power series solutions (6.1)

The Laplace Transform

Definition and properties of the Laplace Transform (7.1, 7.2.1)

Solution of initial value problems (7.2.2, 7.3, 7.4.1, 7.5)

Systems of First Order Linear Differential Equations

Algebraic properties of solutions of linear systems (8.1)

The eigenvalue-eigenvector method of finding solutions (8.2)

Applications

Growth and decay (1.3, 3.1)

Newton's Law of Cooling/Warming (1.3, 3.1)

Numerical technique (2.6)

Mixtures (1.3, 3.1)

Spring-Mass system (5.1)

Population models (3.3)

SIR model (3.3)