



MATH 028: Differential Equations

Term: 2020 Winter Session
Instructor: Staff
Language of Instruction: English
Classroom: TBA
Office Hours: TBA
Class Sessions Per Week: 5
Total Weeks: 3
Total Class Sessions: 15
Class Session Length (minutes): 240
Credit Hours: 4

Course Description:

This course helps students develop an understanding of the theory and applications of differential equations. It will introduce methods of solving first order differential equations with and without initial conditions, second order differential equations with and without initial conditions, higher order differential equations, Laplace transforms, Fourier series, second-order partial differential equations, systems of differential equations, and applications.

Prerequisite: MATH 021 Calculus II.

Course Materials:

Elementary Differential Equations and Boundary Value Problems, 11th edition, W. E.

Boyce and R.C. DiPrima.

Course Format and Requirements:

Students are responsible for lecture notes, any course material handed out, and attendance in class, while attendance will not to be formally recorded. As Mathematics is a cumulative subject and each day builds on the previous day's material. If you have excessive absences, you cannot have a good command of this course. Active participation in the classroom is a great way to



generate the discussion necessary to fully grasp the material.

Attendance

Students are expected to attend and participate in class. Strong attendance and participation are good indicators of success. Each student is responsible for all course material, announcements, quizzes and exams made in class, whether or not the student attended that day's class.

Grading Scale:

A+: 98%-100%

A: 93%-97%

A-: 90%-92%

B+: 88%-89%

B: 83%-87%

B-: 80%-82%

C+: 78%-79%

C: 73%-77%

C-: 70%-72%

D+: 68%-69%

D: 63%-67%

D-: 60%-62%

F: Below 60%

Course Assignments:

Quizzes

Quizzes will be given in lecture. There will be five quizzes given through the whole semester. The lowest one will be dropped. Make-up quizzes will not be given, unless the absence is excused by the instructor.

Homework

Assignments: Homework and classwork will be given regularly. A total of eight assignments will be collected in class in preparation for the quizzes and exams. The problems on the quizzes will be very similar to the homework problems. No aids are allowed and a small amount of memorization might be necessary.

Exams



We will have two midterm exams and a final exam. All exams will be closed-book. A sheet of equations will be provided during these exams. Make-up exams will not be given, unless the absence is excused by the instructor. Appeals for exam scores must be made within one week after the exam was handed back. To make an appeal, you must present the instructor a valid written argument pertaining to the exam problem(s) you wish you appeal.

Course Assessment:

Quizzes (4 out of 5)	10%
Homework	10%
Midterm Exams 1	20%
Midterm Exams 2	20%
Final Exam	40%
Total	100%

Course Schedule:

Week 1- Class 1	Week 1- Class 2
Course overview Go through syllabus; Solution of Some Differential Equations; Classification of Differential Equations	First Order Differential Equations; Linear Equations with Variable Coefficients; Separable Equations <u>Quiz 1</u>
Week 1- Class 3	Week 1- Class 4
Modeling with First Order Equations; Motion with air resistance, compound interest, or Newton's law of cooling	Differences between Linear and Nonlinear Equations; Stability of equilibrium <u>Quiz 2</u>
Week 1- Class 5	Week 2- Class 6
Integrating Factors; Fundamental Solutions of Linear ; Homogeneous Equations;	Existence and Uniqueness The Wronskian; <u>Midterm Exam 1</u>



Exact Equations	
Week 2- Class 7	Week 2- Class 8
Complex Roots of the Characteristic Equations; Repeated Roots Reduction of Order Nonhomogeneous Equations	Method of Undetermined Coefficients Mechanical and Electrical Vibrations Higher Order Linear Equations; General Theory of n-th Order Linear Equations <u>Quiz 3</u>
Week 2- Class 9	Week 2- Class 10
Homogeneous Equations with Constant Coefficients Definition of the Laplace transform	Solution of Initial Value Problems; Step Functions <u>Midterm Exam 2</u>
Week 3- Class 11	Week 3- Class 12
Introduction to System of Two Linear Differential Equations; 2 x 2 Linear Systems of Differential Equations Fundamental Matrices; Eigenvalues	<u>Quiz 4</u> First Order Linear Systems Homogeneous Linear Systems Nonlinear Differential Equations and Stability; Phase Portraits of 2 x 2 Linear Systems
Week 3- Class 13	Week 3- Class 14
Autonomous Systems and Stability Locally-linear systems; Predator-Prey Equations Beginning Partial Differential Equations and Fourier Series <u>Quiz 5</u>	Two-Point Boundary Value Problems; Fourier Series; The Fourier Convergence Theorem Even and Odd Functions; Separation of Variables
Week 3- Class 15	<u>Final Exam (Cumulative): TBA</u>
Solutions of Heat Conduction Problems Laplace's Equation The Wave Equation: Vibrations of an Elastic String Review for final exam	



Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office.

Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.