



MATH 3230: Ordinary Differential Equations

2023 Summer Session	
Total Class Sessions: 25	Instructor: Staff
Class Sessions Per Week: 5	Classroom: TBA
Total Weeks: 5	Office Hours: TBA
Class Session Length (Minutes): 145	Language: English
Credit Hours: 4	

Course Description:

Ordinary differential equations are a fundamental part of the mathematical vocabulary used to describe natural phenomena. This course introduces the following topics in ordinary differential equations: first-order differential equations, second-order linear differential equations, higher-order linear differential equations, the Laplace Transform, and systems of first-order linear equations. The course will include both theories and applications in the field of ordinary differential equations.

Course Material:

Elementary Differential Equations and Boundary Value Problems, William E. Boyce, Richard C. DiPrima, Douglas B. Meade, Wiley, 2017

Course Assignments:

Homework assignments

There will be ten homework assignments in total, which will help students enhance the understanding of the chapter. Students are required to finish it before the deadline. Some of the questions of the midterm and final exams will be related to the homework, so it is important for students to engage into them. Students are encouraged to work with others while solving homework problems, but you must write up your own solutions. The two lowest homework scores will be dropped.

Exams

There will be two midterm exams in class and one comprehensive final exam (the specific time will be announced by the instructor) during the course. The exams will be close-book. Also, you are not allowed to communicate with your classmates. Students are required to take all exams, and there are NO MAKE-UP EXAMS.

Course Assessment:

Homework assignments	20%
Midterm exam 1	20%
Midterm exam 2	20%



Final exam	40%
Total	100%

Grading Scale (percentage):

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
98- 100	93- 97	90- 92	88- 89	83- 87	80- 82	78- 79	73- 77	70- 72	68- 69	63- 67	60- 62	<60

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 Chengdu University of Technology'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.

Course Schedule:

Class	Topics	Assignments
Class 1~5	<p>Introduction</p> <p>Basic mathematical models; direction fields</p> <p>Solutions of some differential equations</p> <p>Classification of differential equations</p> <p>First-order differential equations</p> <p>Linear differential equations; method of integrating factors</p> <p>Separable differential equations</p> <p>Modeling with first-order differential equations</p> <p>Differences between linear and nonlinear differential equations</p>	<ul style="list-style-type: none"> • Homework assignments 1 • Homework assignments 2



Class 6~10	<p>First-order differential equations</p> <p>Autonomous differential equations and population dynamics</p> <p>Exact differential equations and integrating factors</p> <p>Numerical approximations</p> <p>The existence and uniqueness theorem</p> <p>Second-order linear differential equations</p> <p>Homogeneous differential equations with constant coefficients</p> <p>Solutions of linear homogeneous equations; the Wronskian</p> <p>Complex roots of the characteristic equation</p> <p>Repeated roots; reduction of order</p>	<ul style="list-style-type: none">• Homework assignments 3• Homework assignments 4• Midterm exam 1
Class 11~15	<p>Second-order linear differential equations</p> <p>Nonhomogeneous equations; method of undetermined coefficients</p> <p>Variation of parameters</p> <p>Mechanical and electrical vibrations</p> <p>Forced periodic vibrations</p> <p>Higher order linear differential equations</p> <p>General theory of n^{th} order linear differential equations</p> <p>Homogeneous differential equations with constant coefficients</p> <p>The method of undetermined coefficients</p> <p>The method of variation of parameters</p>	<ul style="list-style-type: none">• Homework assignments 5• Homework assignments 6
Class 16~20	<p>The Laplace Transform</p> <p>Definition of the Laplace Transform</p> <p>Solution of initial value problems</p> <p>Step functions</p> <p>Differential equations with discontinuous forcing functions</p> <p>Impulse functions</p> <p>The convolution integral</p>	<ul style="list-style-type: none">• Homework assignments 7• Homework assignments 8• Midterm exam 2



Class 21~25	Systems of first-order linear equations Basic theory of systems of first-order linear equations Homogeneous linear systems with constant coefficients Complex-valued eigenvalues Fundamental matrices Repeated eigenvalues Nonhomogeneous linear systems	<ul style="list-style-type: none">• Homework assignments 9• Homework assignments 10• Final exam
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