

Marshall University Syllabus Department of Mathematics MTH 335-202 Spring 2023

Course Title:	Differential Equations
Course Number:	MTH 335 Section 202 CRN 5263 Credit: 3 Hours
Textbook:	Differential Equations with Boundary Value Problems by Zill, 9E
Sections Covered:	1.1-1.3, 2.1-2.6, 3.1-3.2, 4.1-4.9, 5.1-5.2, 6.1-6.4, 7.1-7.6, 8.1-8.2
Course	First, second, and higher-order ordinary differential equations, Applications
Description:	including vibrations and electrical circuits, Series Solutions, Laplace transform,
	approximate solutions, System of first order linear equations
Calculator:	TI-83 or higher, (TI-89 highly recommended)
Prerequisites:	MTH 231 with "C" or higher
Meeting Time:	MWF: 12:00 – 12:50 PM
Classroom:	Smith Hall 514
Instructor:	Dr. Basant Karna
Office:	Smith Hall 715
Office Hours:	MW: 1:00-2:00 PM, TR: 12:00-2:00 PM (Others by appointment)
Phone/Email:	Phone: (304) 696-4332, Email: karna@marshall.edu
Course	The objectives of this course are to provide students with a clear understanding
Objectives:	of First order DEs, Second and higher order linear DEs and different methods to
	solve them including series solutions and using the Laplace Transform. Students
	will also learn the applications including vibrations and electrical circuits.
Course Contents:	- Introduction
	- First Order Differential Equations
	- Modeling with First-Order Differential Equations
	- Higher Order Linear Equations
	- Modeling with Higher-Order Differential Equations
	- Series Solutions of Linear Equations
	- The Laplace Transform
Attendance Policy:	Attendance is required. Having more than 25% absences may result in a course
	grade of F ! Absences which can be excused include COVID-19 related absences,
	illness, emergencies, or participation in another university activity. Excused
	absences must be approved by the office of the dean of students.
Grading Policy:	A. Exams: There will be 2 exams given in class.
	B. Homework Problems: 10 Homework assignments will be given and
	collected.
	You are responsible for reading the text, working the exercises, and being aware
	of the dates for the major exams.
	C. Final Exam: There will be a two-hour final exam on April 28 at 10:15 AM.
	Attendance/Teaching Eval 30 Pts
	Homework 100 Pts
Points	Exams 200 Pts
Distribution:	Final Exam 100 Pts
	Total Pts: A30 Pts

Grades	The semester grade will be based on the percentage of the 430 total possible points, using the following scale. A: 90 -100 %, B: 80 - 89 %, C: 70 - 79 %, D: 60 - 69 %, F: 0 - 59 % Note: The class score will be posted on <u>http://www.marshall.edu/muonline/</u>
Make-ups:	A. <i>Exams</i>: Making up a missed exam is possible only if you receive prior permission from me and only for serious and unavoidable circumstances.B. <i>Final</i>: If you don't take final exam, you will receive "F" for the class.
Exam Dates:	Exam 1 – February 10, Exam 2 – March 24 (Fridays) Final Exam: April 28 @ 10:15 AM (Friday)
Important Dates:	 January 16, Monday – MLK, Jr. Holiday January 17, Tuesday – "W" Withdrawal period begins March 13, Monday - March 17, Friday– Spring Break April 14, Monday – Last day to drop April 21, Friday – Last class day
Disruptive Actions:	If your actions become disruptive or distracting for me or another student, you will be asked to cease your behavior. Disruptive behavior may include but are not limited to the following: cell phone use in class, talking during class, and the use of iPods or MP3 players during class. These will count as unexcused absences .
University Policies:	 By enrolling in this course, you agree to the University Policies. Please read the full text of each policy (listed below) by going to <u>MU Academic Affairs:</u> <u>University Policies</u>. (URL: http://www.marshall.edu/academic-affairs/policies/) Academic Dishonesty Policy Academic Forgiveness Policy Academic Forgiveness Policy Academic Probation and Suspension Policy Affirmative Action Policy Dead Week Policy D/F Repeat Rule Excused Absence Policy for Undergraduates Inclement Weather Policy Sexual Harassment Policy Students with Disabilities (Policies and Procedures) University Computing Services Acceptable Use Policy
Academic Calendar: Coming Late:	For beginning, ending, and add/drop dates, see the <u>Marshall University</u> <u>Academic Calendar</u> (URL: http://www.marshall.edu/academic-calendar/). Students should join on time and stay in the class for entire class.

Health and Safety Information

All members of the Marshall University community are expected to always observe health and safety protocols. This includes general health and safety protocols as well as specific protocols that might emerge in response to community and campus health conditions.

Note: Homework assignments are posted on the blackboard.

Course Schedule

Week	Sections	Topics
1	1.1-1.3	Definitions and terminology, IVP, DE as Mathematical Models
2	2.1-2.2	Solutions curves without a solution, Separable variables
3	2.3-2.4	Linear equations, Exact equations
4	2.5-2.6	Solutions by substitution, A numerical method
5	3.1, Review	Linear models, Exam 1 on February 10
6	3.2, 4.1	Nonlinear models, Linear differential equations
7	4.2, 4.3	Reduction of order, Homogeneous linear equations with constant coefficients
8	4.4, 4.5	Undetermined coefficients (superposition approach, Annihilator approach)
9	4.6, 4.7	Variation of parameters, Cauchy-Euler equation
10	No Class	March 13, Monday- March 17, Friday – Spring Break
11	4.8, Review	Solving system of linear equations by elimination, Exam 2 on March 24
12	4.9, 5.1	Nonlinear differential equations, Linear models (higher order)
13	6.1, 6.2	Solutions about ordinary points, Solutions about singular points
14	7.1-7.3	Laplace transform, Inverse Laplace transform, Operational properties I
15	7.4-7.6	Operational properties II, Dirac Delta function, system of linear DEs
16	Final Exam	Final Exam on Friday, April 28, 10:15 – 12:15 AM

<u>Recommended Problems</u> (from 8E)

Section 1.1 > 1 - 7(**Odds**), 9, 10, **11**, 17, 20, **23**, 27, **34**, 39, 52 Section 1.2 > 2, 5, 7, 9, 13, 14, 15, 17, 19, 22, 30, 35 - 38 Section 2.1 > 1, 3, 5, 7, 9, 10, 16, 19, 20, 21, 23 Section 2.2 1, 2, 3, 4, 6, 8, 10, 12, 13, 17, 19, 21, 22, 23, 25, 28, 36, 43 Section 2.3 > 2, 3, 5, 7, 9, 12, 17, 20, 24, 28, 33, 37, 53 Section 2.4 1, 3, 4, 7, 9, 10, 13, 16, 21, 25, 29, 32, 35, 38, 45(a) Section 2.5 1, 4, 6, 7, 10, 11, 13, 16, 23, 26, 27, 29 Section 2.6 > 2, 4, 5, 7, 9, 11 Section 3.1 > 1, 2, 3, 4, 5, 6, 9, 11, 13, 14, 17, 21, 22, 23, 25, 29, 31, 32 Section 3.2 1, 2, 3, 5, 6, 9, 19(try), 24(try). Section 4.1 > 1, 3, 4, 5, 7, 9, 12, 13, 15-30(Odds), 31-36(Odds) Section 4.2 > 1, 2, 4, 8, 10, 11, 13, 16, 17, 18, 19 Section 4.3 > 1, 3, 6, 9, 13, 16, 18, 20, 23, 25, 28, 33, 35, 37, 40, 43-48, 49, 51, 59, 61, 65 Section 4.4 > 3, 5, 6, 8, 12, 14, 17, 19, 22, 24, 27, 29, 31, 39 Section 4.5 > 1, 3, 7, 8, 12, 14, 15 - 26(Odds), 31, 33, 37, 40, 42, 46, 48, 53, 57, 60, 67, 70 Section 4.6 > 1, 2, 4, 5, 6, 7, 11, 12, 13, 20, 25 Section 4.7 > 1, 3, 5, 7, 9, 11, 16, 19, 21, 22, 24, 29, 31, 33 Section 4.8 > 1, 3, 5, 6, 8, 10, 16, 21 Section 4.9 1, 4, 6, 13 Section 5.1 > 1, 2, 3, 5(a, b), 6, 8, 11(a-c),(f),(g),(h), 17-20, 23, 26(a),(b), 29, 32, 45, 47, 49, 53 Section 6.1 > 3, 5, 7, 11 19, 23, 27, 28, 33 Section 6.2 > 1, 3, 7, 9, 13, 18, 21 Section 6.4 1, 3, 5, 7, 9, 10, 27(a) Section 7.1 1, 3, 5, 7, 9, 12, 14, 17, 20, 23, 28, 32, 33, 36, 37 Section 7.2 1, 4, 8, 10, 11, 13, 15, 19, 23, 26, 30, 33, 34, 35, 38 Section 7.3 3, 6, 7, 11, 15, 20, 21, 25, 37, 41, 43, 47, 48, 55, 57, 63, 65, 67 Section 7.4 1, 3, 7, 9, 11, 19, 21, 28, 31, 37, 39, 43