MATH 3020 Sec A
Fall 2021

Course Title/Number	Differential Equations: MATH 3020 Sec A
Semester/Year	Fall 2021
Days/Time	MWF 1:00-1:50PM;
Location	HSC 2238
Instructor	Dr. Michael Otunuga
Website for Past Question	The syllabus and other relevant materials can be found on my website here: https://spots.augusta.edu/OOTUNUGA/
Office	GE 3018
Office Hours	MWF 10:00AM-12:00PM; others by appointment. To make an appointment, email in advance when possible.
Phone	(706) 667-4477
E-Mail	ootunuga@augusta.edu
Prerequisites	MATH 2012 (Calculus and Analytic Geometry II) or equivalent with a grade of C or better.
Text	*Fundamentals of Differential Equations*, 9th edition, by Nagle, Saff, and Snider.
Software	We will be using Excel and Matlab in class to run simulations. Try to download copies of these softwares on your laptop by going to https://www.augusta.edu/its/software.php You will be notified in advance when to bring your laptop to class.
Calculator	Graphing calculator. It may not be allowed in exam
Homework	Homework will be assigned in class. See Course Requirements and Schedule below for details.
Course Description	A study of first-order and linear second-order differential equations with applications. Topics include solution techniques, qualitative behavior, numerical methods, Laplace transformations, and the use of series.
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to https://www.augusta.edu/compliance/policyinfo/policies.php Cheating, plagiarism, collusion, and any form of academic misconduct are prohibited in this class. For detailed definition of these, see the full text by going to https://www.augusta.edu/compliance/policyinfo/policy/academic-honesty.pdf

Course Requirements / Due Dates

Attendance: Attendance is compulsory for this class and will be taken every lecture. Coming late to class (more than 5minutes) and leaving class early, playing with cell phone, working on material for another class, sleeping in class will be counted as an unexcused absent.

Homework: Homework will be assigned in class every Friday and due the following Wednesday. There will be **no make ups for homework assignments**. Homework must be turned in ahead of time if the absence is planned can be scanned and emailed in the event of an unplanned absence

Projects: Projects will be assigned as a take-home/reading material. Class will be divided into smaller groups. Each group will be asked to present their project/reading materials during class. Students will be expected to collaboratively discuss and clearly explain solutions to the problem assigned to their group.

Exams: There will be 2 **in-class** tests during the semester on **Sept. 13, Oct. 11**.
Make-ups will be given for tests only if you contact the instructor within 24 hours of missing the test and present verifiable documentation of the excused absence as soon as possible. *If the absence is planned, then the t should be taken ahead of time.* Anything missed because of an unexcused absence will be recorded as a zero.

Final Exam: The final exam will be on **Wednesday, Dec. 8, 2021, from 2:00-4:00PM**. Please make travel arrangements accordingly. Make-up/early tests will not be available to accommodate individual travel plans.

Presentation of Work: All graded assignments will be graded based on both accuracy of solutions and presentation of the work. The proper use of notation, organization and presentation of work are important. Graded work will be evaluated accordingly with the deduction of points for incomplete or improper use of notation!

Grading Policy

	Points	**Weight**
Attendance	25 points	$\frac{25}{575} * 100$
Homework	100 points	$\frac{100}{575} * 100$
Project	100 points	$\frac{100}{575} * 100$
Two major exams	200 points	$\frac{200}{575} * 100$
Final (comprehensive) exam	150 points	$\frac{150}{575} * 100$
Total	**575points**	**100%**

The grading scale is rigid.

90.00 – 100	A
80.00 – 89.99	B
70.00 – 79.99	C
60.00 – 69.99	D
Below 60.00	F

Week	Dates	**Approximate schedule: Sections covered and topics**
1	8/11-8/13	1.1: Background 1.2: Solutions and Initial Value Problem
2	8/16-8/20	1.3: Direction Fields 1.4: The Approximation Method of Euler
3	8/23-8/27	**Chapter 2: First-Order Differential Equations** 2.1: First-Order Differential Equations: Introduction 2.2: Separable Equations
4	8/30-9/3	2.3: Linear Equation 2.4: Exact Equations
5	9/6-9/10	**9/6: Labor Day. No class** 2.5: Special Integrating Factors 2.6: Substitution and Transformations
6	9/13-9/17	**Exam 1 on Monday, 09/13/21: Exam will cover Chapters 1 and 2** 3.1: Mathematical Modeling 3.2: Mixing Problems, Population Models; Heat transfers 3.3: Heating and Cooling
7	9/20-9/24	3.3: Heating and Cooling 3.6: Numerical methods: Euler Algorithm revisited
8	9/27-10/1	**Chapter 4: Linear Second-Order Equations** 4.1: The Mass-Spring Oscillator 4.2: Homogeneous Linear Equations 4.3: Auxiliary Equations with Complex Roots
9	10/4-10/8	4.4: Nonhomogeneous equations: Method of Undetermined Coefficients 4.5-4.6: Variation of Parameters 4.7: Variable-Coefficient Equations
10	10/11-10/15	**Exam 2 on Monday, 10/11/21: Exam will cover Chapters 3 and 4** **Chapter 7: Laplace transform** 7.1: Introduction to Laplace transform 7.2: Definition 7.3: Properties of Laplace transform
11	10/18-10/22	7.3: Properties of Laplace transform 7.4: Inverse Laplace Transform
12	10/25-10/29	7.5: Solving Initial Value Problems 7.6: Transforms of Discontinuous Functions
13	11/1-11/5	7.8: Convolution 7.9: Impulses and the Dirac Delta Function
14	11/8-11/12	7.10: Solving Linear Systems with Laplace Transforms **Chapter 8: Series Solutions to Differential Equations** 8.1: Introduction: The Taylor Polynomial Approximation
15	11/15-11/19	8.2: Power Series and Analytic Functions 8.3: Power Series Solutions to Linear Differential Equations 8.4: Equations with Analytic Coefficients (Maybe)
16	11/22-11/26	**11/24-11/26: Thanksgiving**
17	11/29-12/3	8.5: Cauchy-Euler Equations 8.6: Method of Frobenius **12/2: Reading day, no class**

Homework Problems

1.1: 2, 6, 11, 14
1.2: 2, 4, 8, 22, 26
1.3: 2, 7, 16 (sketch using method of isoclines)
1.4: 2, 6, 8
2.2: 4, 6, 15, 17, 21, 30, 34
2.3: 2, 3, 4, 8, 10, 19, 28
2.4: 2-8 (even), 10, 22, 28, 30
2.5: 8, 10, 13
2.6: 4, 8, 12, 22, 25
3.2: 4, 9, 11, 18, 24
3.3: 5, 6
3.6: 2, 8, 10
4.1: 2, 4, 8
4.2: 12, 20, 24, 28, 30, 35c
4.3: 8, 22, 26, 29b, 33
4.4: 2, 12, 19, 32, 36 (only particular solution for 12, 19, 20, 36)
4.5: 6, 9, 15, 19, 26, 28
4.6: 4, 7, 10, 18, 24
4.7: 6, 10, 16, 24b, 30
7.2: 4, 7, 12, 14, 20, 22, 24
7.3: 4, 6, 7, 9, 10, 14, 18, 30
7.4: 1, 2, 6, 10, 12, 14, 22, 24, 28, 32a
7.5: 4, 8, 13, 18, 32, 36
7.6: 12, 16, 22, 30
7.8: 4, 6, 8, 10, 16, 26
7.9: 8, 14, 16
7.10: 2, 10, 16
8.1: 6, 8
8.2: 2, 3, 5, 8a, 12
8.3: 2, 8, 12, 18, 22
8.4: 1, 4, 10, 14, 16, 22