NAU NORTHERN ARIZONA UNIVERSITY

Course Title: MAT 239 Differential Equations
Term: Fall 2022
Instructor: TBA
Course Credit: 3
Mode of Instruction: Online

Course Description:

This course covers the solutions of first-order differential equations, nth-order linear equations, systems of linear differential equations, series solutions. The usefulness of ordinary differential equations for modeling physical and other phenomena will be also demonstrate. Complementary mathematical approaches for their solution will be presented, including analytical methods, graphical analysis and numerical techniques.

Course Prerequisites:

MAT 238 Calculus III

Learning Outcomes:

By the end of the course, the student should be able to:

A. Engage students in sound mathematical thinking and reasoning;

B. Provide a setting that prepares students to read and learn mathematics on their own;

C. Explore multiple representations of topics including graphical, symbolic, numerical, oral and written. Encourage students to make connections between the various representations to gain a richer, more flexible understanding of each concept;

D. Develop a mathematical vocabulary by expressing mathematical ideas orally and in writing;

E. Demonstrate the ability to integrate knowledge and ideas of differential equations in a coherent and meaningful manner for solving real world problems.

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Course Material:

Simmons, G.F., ***Differential Equations with Applications and Historical Notes***, 3th Edition, CRC Press;Chapman and Hall/CRC, 2017.

Evaluation:

- Homework [40%]
- Mid-term Exam [25%]
- Final Exam [35%]

Description of the Evaluation tasks:

Assignment/ Essay/ ... : During the term, students will be required to finish several evaluation tasks within due date. All the tasks are linked with specific course topics/outcomes and will adequately assess students' competence and learning outcomes. Students are encouraged to meet with instructor about these tasks at any point.

Mid-term/ Final Exams/ Quiz/... : There may be periodic quizzes given at the beginning of lecture sessions; the feedback from these quizzes will monitor the progress of the learners and help to set learning priorities. There will be mid-term exam/ final exam for the course. They are the basic criteria for the evaluation of students' learning outcomes and final grade.

Grading Policy:

Students are supposed to finish each online lecture. Prior to each class, students should finish the required readings. During the class time, students are encouraged to make use of all relevant online course resources and communicate with the instructor. Students' grades are accumulated based on the cumulative evaluations.

Students' letter grade will be assigned according to the following scale:

A+ 90-100	A 85-89	A- 80-84
B+ 77-79	B 73-76	B- 70-72
C+ 67-69	C 63-66	C- 60-62
D+ 57-59	D 53-56	D- 50-52
F < 50		

Academic Integrity:

Students must strictly adhere to the university's academic integrity rule; and all essays, exams and any other form of academic assignments must adhere to these rules. Any form of plagiarism, cheating, or misappropriation of materials will be considered a violation of academic integrity and will be punishable by the university.

Withdrawal from the Course(s):

Students will be able to apply for a transfer or withdrawal within 3 days of the starting date of the course. If a withdrawal is applied for within 3 working days, the tuition fee will be fully refunded. After 3 days, the tuition fee will not be refunded. If a withdrawal is applied for in the first two weeks, it will be recorded as W (Withdraw) on the course transcript. After this initial two-week period, the class will be recorded as F (Fail).

Tentative Schedule:

Week 1	
1	The Nature of Differential Equations. Separable Equations
2	First Oder Equations
3	Second Order Linear Equations
4	Qualitative Properties of Solutions
5	Qualitative Properties of Solutions (Cont.) **Homework#1**

Week 2	
6	Power Series Solutions and Special Functions
7	Fourier Series and Orthogonal Functions
8	Partial Differential Equations
9	Boundary Value Problems
10	Some Special Functions of Mathematical Physics **Homework#2**
Week 3	
11	Laplace Transforms
12	Systems of First Order Equations
13	**Mid-term Exam**
14	Nonlinear Equations
15	Nonlinear Equations (Cont.) **Homework#3**
Week 4	
16	The Calculus of Variations
17	The Existence and Uniqueness of Solutions
18	The Method of Successive Approximations
19	Picard's Theorem
20	Numerical Methods **Homework#4**
Week 5	
21	The Method of Euler
22	Errors
23	An Improvement to Euler
24	Final Exam Reviews
25	**Final Exam**