Instructor: **Office Hours:**

Maggie Rahmoeller   Trexler 270J   Mon/Wed/Fri: 11AM-12PM
(540) 375-2505   rahmoeller@roanoke.edu   Tue/Thu: 10AM-12PM

Overarching Goals:
Students will be able to:
- Apply their knowledge of differential equations to real-world phenomena.
- Compare the many different techniques available for solving ordinary differential equations – most importantly determining which is appropriate for a given problem.
- Utilize technology to both find and visualize solutions to differential equation problems.

Ancillary Skill Goals:
Students will be able to:
- Successfully employ techniques to analyze solutions of first and second order linear differential equations, systems of equations, and almost linear systems.
- Draw conclusions about the solutions to a variety of differential equations, without finding the solutions.
- Understand the role of modeling with differential equations in problem solving.

Course Objectives: This course will provide the student with an introduction to differential equations, with the focus being on real-world applications. Topics include: First order differential equations, population and other physical models, linear equations of higher order, systems of differential equations, and non-linear systems and phenomena.

Text: *Elementary Differential Equations and Boundary Value Problems.* Boyce and DiPrima, 10th Ed.

Reading: The daily syllabus is attached. It is expected that students will read ahead and come to class prepared to discuss the material.

Attendance: Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. When absent, excused or unexcused, you are responsible for all material covered in class. You will not be allowed to make up any work missed due to an unexcused absence.

Grading: The following Table lists the weights for the various forms of assessment for this class:

Tests	40%
Project	20%
HW & Quizzes	20%
Final Exam	20%

No test or quiz scores will be dropped when calculating averages. A *tentative* guideline for determination of grade will then be:

0	60	63	67	70	73	77	80	83	87	90	93	100
F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	

Attendance and class participation will be considered when determining marginal and plus or minus grades.

Homework / Quizzes: Homework problems will be assigned daily. Do not wait to start these until the night before the next class period! Most days some work will be collected and graded. The homework may be problems from the text, or a specific single problem assigned separately. There may also be in-class quizzes.

Tests / Final Exam: There will be three tests this semester. Homework and class notes are absolutely the best sources of review! The tests will not be designed to be cumulative, but as with any course involving mathematics, material from previous tests can be thought of as a prerequisite for future tests. The final exam for this class will be given during the scheduled time for Block 9, i.e. **Friday, April 29 from 8:30-11:30AM**.

Project: There will be a project consisting of a paper about a specific model or type of differential equation. This project will be assigned after Spring Break.

MCSP Conversations: The Math, Computer Science and Physics department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face our discipline.

Sessions are currently being scheduled, and all will be announced in advance: MCSP Conversation Series

Members of this class are invited be involved with all of these meetings; however participation in **at least** **three** of these sessions is mandatory. After attending, students will submit within one week of the presentation a one-page paper reflecting on the discussion. This should *not* simply be a regurgitation of the content, but rather a personal contemplation of the experience.

Academic Integrity: Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No electronic devices other than calculators can be taken out during any class or testing period.

Disability Services: The Office of Disability Support Services, located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library, provides reasonable accommodations to students with identified disabilities. Reasonable accommodations are provided based on the diagnosed disability and the recommendations of the professional evaluator. In order to be considered for disability services, students must identify themselves to the Office of Disability Support Services. Students requesting accommodations are required to provide specific current documentation of their disabilities. Please contact Rick Robers, M.A., Coordinator of Disability Support Services, at 540-375-2247 or e-mail robers@roanoke.edu.

Subject Tutoring: Subject Tutoring is a CRLA Nationally Certified Program located on the lower-level of Fintel library in room 005. Subject Tutoring offers individual appointments in 30-minute intervals for Lab Sciences, Modern Languages, Math & CPSC, Social Sciences, and Business & Economics. Hours are Sunday - Thursday 4 p.m. - 9 p.m. For a list of tutorials or to make an appointment, go to www.roanoke.edu/tutoring.

Writing Center: The Writing Center @ Roanoke College, located on the Lower Level of Fintel Library, offers writing tutorials focused on written and oral communication for students working on writing assignments/projects in any field. Writers at all levels of competence may visit the Writing Center at any point in their process, from brainstorming to drafting to editing, to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 pm. Simply stop in, or schedule an appointment by going to www.roanoke.edu/writingcenter, where our schedule of writing workshops and creative writing playshops is also posted. Questions? Email writingcenter@roanoke.edu or call 375-4949. Like our Facebook page for updates!

Tentative Daily Schedule for Math 331

Tue	Jan 19	1.1, 1.2, 1.3	Models, Direction Fields, and Solutions
Thu		2.1	Linear Equations: Method of Integrating Factors
Tue	Jan 26	2.2, 2.3	Separable Equations and Modeling
Thu		2.4, 2.5	Linear/Nonlinear Equations, Population Dynamics
Tue	Feb 2	2.6	Exact Equations
Thu		Review	
Tue	Feb 9	**Test 1**	
Thu		3.1	Homogeneous Equations with Constant Coefficients
Tue	Feb 16	3.2	Solution of Linear Homogeneous Equations
Thu		3.3, 3.4	Characteristic Equation – Complex and Repeated Roots
Tue	Feb 23	3.5, 3.6	Undetermined Coefficients / Variation of Parameters
Thu		Review	
Tue	March 1	**Test 2**	
Thu		7.1, 7.2	System of Equations, Linear Algebra Review

Spring Break

Tue	March 15	7.3, 7.4	Linear Algebraic Equations / Theory of Systems
Thu		7.5, 7.6	Homogeneous Systems / Complex Eigenvalues
Tue	March 22	7.8	Repeated Eigenvalues
Thu		Review	
Tue	March 29	**Test 3**	
Thu		9.1, 9.2	Stability and the Phase Plane
Tue	April 5	9.3	Locally Linear Systems
Thu		9.3	Locally Linear Systems
Tue	April 12		
Thu		9.4, 9.5	Competing Species & Predator-Prey Models
Tue	April 19	9.6	Liapunov's Second Method
Thu		Review	
Fri	April 29	**Final Exam**	8:30-11:30AM

This course expects you to spend at least 12 hours of work each week inside and outside of class.