

# MTH 244 - DIFFERENTIAL EQUATIONS

## Section 0002, Spring 2019

### COURSE INFORMATION

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Instructor: Erin Denette, Ph.D., edenette@uri.edu, Lippitt 202B, (401)874-2397  
Textbook: *An Introduction to Differential Equations and Their Applications* by S.J. Farlow  
Class Times: TTh 2-3:15 P.M., White 204  
Office Hours: TTh 11 A.M.-12:15 P.M.

### COURSE DESCRIPTION

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MTH 244 covers the classification and solution of differential equations involving one independent variable, applications to the physical sciences, and basics for further study in applied mathematics and also for advanced work in physics and engineering. (Lec. 3) Prerequisite: MTH 142.

### MTH 244 LEARNING OUTCOMES

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By the end of the semester, students will be able to use numerical, graphical, and analytic techniques to analyze and/or solve scalar and systems of differential equations, and to apply these concepts in the study of basic mathematical models.

### EVALUATION

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Final grades will be based on three midterm exams (in class on Tuesdays 2/19, 3/26, and 4/23), homework, and a comprehensive final exam (Thursday 5/2 from 11:30-2:30 in our usual classroom) as follows:

Homework	25%
Three Exams	45% (15% each)
Final Exam	30%

Assignments will not be graded on a curve nor will any extra credit be made available. **No late work will be accepted. Missed assignments cannot be made up.** There are situations which warrant exceptions; these are outlined in the University Manual.

### LETTER GRADE DISTRIBUTION

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Final grades will be determined according to the following scale.

93 - 100	A	87 - 89.99	B+	77 - 79.99	C+	67 - 69.99	D+	0-59.99	F
90 - 92.99	A-	83 - 86.99	B	73 - 76.99	B	60 - 66.99	D		
		80 - 82.99	B-	70 - 72.99	C-				

### HOMEWORK

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Assigned homework problems from the book will be announced in class daily and will typically be collected at the beginning of the following class day. Students are encouraged to work together but must turn in their own work. Note that the answers to most homework problems can be found in the back of your book. Homework questions may be addressed in class as time permits.

### HOMEWORK POLICIES

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The following policies apply to all homework assignments, and no exceptions will be made.

- At the top of the first page of your homework, you must give your name and list the sections and corresponding problems the homework covers; for instance 2.3 - 1,6,7,9.
- Homework must be neat, stapled in order, and *show all work*. Messy assignments or assignments where insufficient work is shown will be given a grade of 0.

## TECHNOLOGY

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The use of technology, including calculators, is **prohibited** on all in-class assessments and exams. All electronic devices (cell phones, ipads, ipods, laptops, etc.) should be turned off during class. Excepted from this are tablets used for note-taking.

## EXAM POLICIES

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The following policies apply to all exams, and no exceptions will be made.

- Any books, bags, papers, extra scrap paper, or anything else must be put away in a closed bag and stowed under your desk.
- No calculators of any kind are permitted on exams. No electronic devices of any kind may be used or even accessible to you at any time during the exam.
- You may not leave the room without authorization during the exam. If you leave the room for any reason, your exam will be collected.

## EXPECTATIONS

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- You are expected to attend every lecture, and to submit your homework on time. We cover a lot of information at a rapid pace; missing a class will result in a large amount of material missed. Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.
- It is your responsibility to communicate clearly in writing up solutions for homework, quizzes, and exams. Your results must display your understanding well and be written in a correct, complete, coherent, and well organized fashion. The rules of language still apply in mathematics, and they apply even when symbols are used in formulas, equations, etc. Precise communication and neatness count!
- The pace of the class requires that you spend enough time every week doing homework, reviewing notes, reading the textbook, and working out extra problems, all in addition to the time spent in class.

## ACADEMIC HONESTY POLICY

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Cheating is defined in the University Manual section 8.27.10 as the claiming of credit for work not done independently without giving credit for aid received, or any unauthorized communication during examinations. Students are expected to be honest in all academic work. The resolution of any charge of cheating or plagiarism will follow the guideline set forth in the University Manual sections 8.27.10-8.27.21.

Furthermore, course content and outlines, exams, and assignments created by instructors shall be considered the instructors' intellectual property. Course materials shall not be distributed, shared in any public domain or third party website, or sold without prior written consent of the instructor. See the University Manual section 8.27.22.

## SPECIAL NEEDS

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Any student with a documented disability is welcome to contact their instructor as early in the semester as possible so that reasonable accommodations may be arranged. As part of this process, please be in touch with Disability Services for Students Office at 302 Memorial Union, 401-874-2098 (<https://web.uri.edu/disability/>).

## ACADEMIC ENHANCEMENT CENTER

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This is a challenging course. Success requires that students keep pace with the work, understand course concepts, and study effectively. The Academic Enhancement Center helps URI students succeed through three services: Academic Coaching, Tutoring, and The Writing Center. To learn more about any of these services, please visit <https://web.uri.edu/aec/> or call 401-874-2367 to speak with reception staff.

## NO WORK SUBMITTED AND INCOMPLETE GRADES

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University of Rhode Island regulations concerning no work submitted and incomplete grades will be followed. See the University Manual section 8.53.12 regarding no work submitted and sections 8.53.20 and 8.53.21 regarding incomplete grades for details.

## RELIGIOUS HOLIDAYS

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It is the policy of the University of Rhode Island to accord students, on an individual basis, the opportunity to observe their traditional religious holidays. Students who plan to be absent from classes or examinations for religious holy days that traditionally preclude secular activity shall discuss this with the appropriate instructor(s) in advance of the holy day. See the University Manual section 8.51.11 for details.

## STANDARDS OF BEHAVIOR

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Students are expected to treat faculty and fellow classmates with dignity and respect. Students are responsible for being familiar with and adhering to the published “Community Standards of Behavior: University Policies and Regulations” which can be accessed in the University Student Handbook

<https://web.uri.edu/studentconduct/university-student-handbook/>

# MTH 244 SECTION 0002 HOMEWORK PROBLEMS

Other sections may be covered and additional homework may be assigned as time allows.

Sections	Assigned Problems
1.1 - Basic Definitions and Concepts	2,4,5,6,8
1.2 - Some Basic Theory	1-5,12,14,30,31,34
2.1 - First-Order Linear Equations	2,4,13,19,20
2.2 - Separable Equations	2,4,6,8,10,13,14,18,23,30
2.3 - Growth and Decay	16,26
2.4 - Mixing Phenomena	1,3*,4*
2.5 - Cooling and Heating Phenomena	4,7,8
3.1 - Introduction to 2nd Order Linear Equations	1,3,6,10,11,15,18,41,42,43
3.2 - Fundamental Solutions of the Homogeneous Equations	6,8,10,13,18
3.3 - Reduction of Order	2,4,6,8,10
3.4 - Homogeneous Equations with Constant Coefficients: Real Roots	2,4,6,12,16
3.5 - Homogeneous Equations with Constant Coefficients: Complex Roots	1,4,8,12,14
3.6 - Nonhomogeneous Equations	1,2,3,10
3.7 - Solving Nonhomogeneous Equations: Method of Undetermined Coefficients	5,13,14,24,32
3.8 - Solving Nonhomogeneous Equations: Method of Variation of Parameters	3,6,7,13,14
4.1 - Introduction: A Review of Power Series	9,10,13,14,15
4.2 - Power Series Expansions about Ordinary Points: Part 1	1-5,6,10,12,13,14
4.3 - Power Series Expansions about Ordinary Points: Part 2	1-5
5.1 - Definition of the Laplace Transform	1,2,3,9,11
5.2 - Properties of the Laplace Transform	1-4,6,7*,8,10,11,19
5.3 - The Inverse Laplace Transform	1,2,5,13,16
5.4 - Initial Value Problems	1,2,3,6,8
6.1 - Introduction to Linear Systems: The Method of Elimination	2,4,7,10,16
6.7 - Nonhomogeneous Linear Systems: Laplace Transform	1-5

\* Note: The answers in the back of the book for problems with this mark have errors. The correct answers are provided below.

$$2.4 \# 3(d) \frac{dQ}{dt} + \frac{Q}{50} = 0.4$$

$$2.4 \# 4(a) \frac{dQ}{dt} + \frac{5Q}{100-2t} = 0; Q(0) = 300$$

$$5.2 \# 7 \frac{4(3s^2 - 4)}{(s^2 + 4)^3}$$