

University of Rhode Island  
Department of Mathematics

Course and Section number: MTH 244 Sections 01 and 04  
Course Title: Differential Equations  
Semester and Year: Spring 2018  
Class Day(s)/Time: Section 01: MWF, 11:00 AM – 11:50 AM  
Section 04: MWF, 12:00 PM – 12:50 PM  
Class Location: Section 01: Ballentine Hall 115  
Section 04: Pastore Hall 122

---

Instructor: Alex Kodess  
Office Location: Lippitt Hall 202H  
Email: [kodess@uri.edu](mailto:kodess@uri.edu)  
Office Hours: TTh 10:00 AM – 12:00 PM

---

**Course Description:** LEC: (3 crs.) Basic definitions of and concepts of the theory of ODEs. First-order and separable ODEs. Second-order linear ODEs. Series Solutions. Laplace Transform. Systems of ODEs.

**Prerequisite(s):** MTH 142

**General Education Area(s) and Outcome(s):** None.

**Credit Hours:** 3

**Required Textbook(s):** *An Introduction to Differential Equations and Their Applications*, by S. J. Farlow.

**Other Required Material(s):** I highly recommend *Paul's Notes on Differential Equations* by Paul Dawkins available at <http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>. This is a great source of worked-out examples.

**Course Goals:**

This is a typical introductory course in differential equations. It lays foundations in the general theory of ODEs, provides a survey of methods and techniques, and discusses some of the applications of differential equations.

**Learning Outcomes:**

At the end of the course the student should be able to:

1. use numerical, graphical, 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.

## Grade Distribution:

|                |                       |
|----------------|-----------------------|
| 25% Exam 1     | 3/5                   |
| 25% Exam 2     | 4/18                  |
| 20% Quizzes    |                       |
| 30% Final Exam | Cumulative final exam |

## Letter Grade Distribution:

|                |    |               |    |
|----------------|----|---------------|----|
| 92.00 - 100.00 | A  | 68.00 - 70.99 | C  |
| 87.00 - 91.99  | A- | 65.00 - 67.99 | C- |
| 82.00 - 86.99  | B+ | 61.00 - 64.99 | D+ |
| 78.00 - 81.99  | B  | 55.00 - 60.99 | D  |
| 75.00 - 77.99  | B- | 0.0 - 54.99   | F  |
| 71.00 - 74.99  | C+ |               |    |

## Instructor Policies for the Course:

- **Attendance**

Attendance is a vital and necessary part of this course. While there is no formal attendance policy, 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.

- **Expectations**

- You are expected to attend every lecture and **read and work through lecture notes before they are discussed in class.**
- The rapid pace of the class requires that you spend time every day doing homework, reviewing notes, reading the textbook, all in addition to the time spent in class.

- **Homework** There is no collected or graded homework in this class. However, **doing homework problems is one most important component of this course!**

- **Makeup Policy**

Makeup exams may be scheduled in the event you are unable to attend exams under the following conditions. In particular, if you must miss the exam because of a scheduling conflict, you must notify your instructor before, not after, the exam, and emergencies require you to contact your instructor within 24 hours. See University Manual sections 8.51.10 and 8.51.14 for guidelines.

- If your reason for missing the exam as scheduled is (i) a University sanctioned event for which verifiable documentation can be provided (including another scheduled class), (ii) a responsibility to an employer that cannot be rescheduled (with documentation from your employer), or (iii) Religious holidays, then you **MUST INFORM YOUR INSTRUCTOR 48 HOURS IN ADVANCE OF THE EXAM AND PROVIDE DOCUMENTATION IF REQUESTED.** Makeup exams will be scheduled after the actual exam, and preferably before the class period when exams are to be handed back, but no later than one week after the original date.
- If the reason for missing the exam as scheduled is due to (i) illness (with verifiable documentation from a medical provider), or (ii) an emergency (with appropriate documentation), then you **MUST INFORM YOUR INSTRUCTOR WITHIN 24 HOURS**

OF THE EXAM and provide documentation upon your return. Failure to notify your instructor within 24 hours will result in a 0 for the exam. No exceptions. Makeup exams may be scheduled no later than a week after the original date, unless the illness or emergency precludes this, in which case the makeup exam will be given on a common date during the last two weeks of the semester.

Students that miss course work (not exams) under the same the conditions mentioned above will be given the opportunity to make up the course work.

- **Electronic Devices**

The classroom is a place for learning. While you are in class, I expect you to remain focused on the course material, and also to maintain an environment in which other students can do the same. In particular:

- Laptops and tablets can be useful for taking notes or for annotating electronic copies of the provided lecture notes. However, they can also be major distractions. Avoid the temptation to screw around on the internet during class! This is distracting not only to you, but also to other students sitting nearby. Use of laptops or tablets for any purpose other than note-taking will not be permitted.
- Cell phones should be muted and stored away at all times during class. Ringing phones are disruptive. Texting during class is flat-out disrespectful.
- All in-class discussion must pertain to the course material. Asking your neighbor about triple integration in spherical coordinates is fine; asking them about Friday nights frat party is not. Off-topic chatter can be distracting to other students.

- **Other Policies:**

- There is no extra credit in this course. Please don't ask.

### **Academic Honesty Policy:**

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 8.27.10-8.27.21, <http://web.uri.edu/manual/chapter-8/chapter-8-2/>.

### **Special Needs:**

Any student with a documented disability should contact your instructor early in the semester so that he or she may work out reasonable accommodations with you to support your success in this course. Students should also contact Disability Services for Students: Office of Student Life, 330 Memorial Union, 874-2098. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

### **Academic Enhancement Center (AEC):**

In addition to your instructor's office hours, there is help available from the Academic Enhancement Center (AEC). The AEC offers three types of help: Weekly Tutoring Groups, Tutoring (both walk-in and appointment-based types), and Academic Coaching. For more information on AEC services, study tips, and SI session, visit the AEC website at <http://web.uri.edu/aec/>.

**Incomplete Grade:**

University of Rhode Island regulations concerning incomplete grades will be followed. See University Manual sections 8.53.20 and 8.53.21 for details.

**Religious holidays:**

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 desiring to observe a holiday of special importance must provide written notification to each instructor.

**Standards of behavior:**

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 ([web.uri.edu/studentconduct/university-student-handbook/](http://web.uri.edu/studentconduct/university-student-handbook/)). If you must come in late, please do not disrupt the class. Please turn off all cell phones or any electronic devices.

**Tentative Course Outline:** The weekly coverage might change as it depends on the progress of the class. Sections marked with an asterisk will be covered should time permit.

| Section of Text                                       | Homework Problems                 |
|---|-----------------------------------|
| 1.1 Basic Definitions and Concepts                    | 14, 16, 18                        |
| 1.2 Some Basic Theory                                 | 26, 34, 41, 42, 44, 46, 47        |
| 2.1 First-Order Linear Equations                      | 5, 7, 10, 15, 20, 22, 23, 25, 31  |
| 2.2 Separable Equations                               | 21, 23, 24, 25, 30, 35, 38, 45    |
| 3.1 Introduction to Second-Order Linear Equations     | 27, 31, 35, 36, 37, 43            |
| 3.2 Fundamental Solutions of the Homogeneous Equation | 9, 17, 22, 23, 25, 29, 31, 33, 37 |
| 3.3 Reducton of Order                                 | 6, 7, 8, 9, 10, 19                |
| 3.4 Homogeneous Equations with Constant Coefficients  | 5, 10, 19, 20, 21, 22             |
| 3.5 Homogeneous Equations with Constant Coefficients  | 9, 11, 15, 16, 18                 |
| 3.6 Nonhomogeneous Equations                          | 9, 10, 12, 14, 15                 |
| 3.7 Method of Undetermined Coefficients               | 13, 21, 26, 35, 36, 37, 38        |
| 3.8 Method of Variation of Parameters                 | 8, 9, 10, 11, 12, 16, 24          |
| 4.1 Review of Power Series                            | 7, 8, 11, 17, 19, 25, 28          |
| 4.2 Power Series Expansions, Part I                   | 6, 7, 10, 14, 18, 19, 20, 21      |
| 4.3 Power Series Expansions, Part II                  | 4, 5, 7, 8, 10, 11, 12            |
| *4.4 Series Solutions about Singular Points           | TBA                               |
| 5.1 Definition of the Laplace Transform               | 8, 16, 24, 39, 45, 46, 49         |
| 5.2 Properties of the Laplace Transform               | 19, 20, 24, 26, 35, 42, 43        |
| 5.3 The Inverse Laplace Transform                     | 12, 19, 20, 24, 26                |
| 5.4 Initial-Values Problems                           | 3, 12, 14, 15, 16, 17             |
| 6.1 Introduction to Linear Systems                    | 11, 15–18                         |
| *3.12 Introduction to Higher-Order Linear Equations   | TBA                               |
| *6.7 Nonhomogeneous Linear Systems: Laplace Transform | TBA                               |