

# Math 2233.004, Differential Equations

## Course Information

Dr. L. Mantini  
Fall 2010

**Professor:** Dr. Lisa Mantini, 410 Math Sciences, email [mantini@okstate.edu](mailto:mantini@okstate.edu), telephone 744-5777, web page <http://www.math.okstate.edu/~mantini>. Our course will have a page on OSU's online classroom at <https://oc.okstate.edu>.

**Course Times:** Tuesdays and Thursdays from 12:30 – 1:45 PM in HES 316.

**Office Hours:** Monday 11:00–12:30 PM, Wednesday 1:30–3:00 PM, and by appointment.

**MLRC:** Special tutoring hours at the MLRC for our course, starting August 24, are Tuesdays from 5:00 – 8:00 PM and Fridays from 2:00 – 5:00 PM.

**Text:** *Elementary Differential Equations with Boundary Value Problems*, **ninth edition**, by Boyce and DiPrima. The Student Solutions Manual is helpful but optional. I give information below for owners of the eighth edition who don't wish to buy a new book.

**Calculators:** You may borrow a graphing calculator from the Math Department, if you do not own one. The TI-89, or other symbolic manipulating calculator, will not be permitted on exams, but the use of other graphing calculators during exams is permitted.

**Prerequisites:** The prerequisite for this course is a solid knowledge of techniques of integration and manipulation of exponentials and power series, typically as shown by a grade of C or better in Math 2153, Calculus II.

**Course Requirements:** The requirements for this course are as follows:

- Three **midterm exams** worth 100 points each, tentatively scheduled on
  - Thursday, September 30;
  - Thursday, October 28; and
  - Thursday, December 2 (or Exam 3 could be given before Thanksgiving).
- A 200 point **final exam**, **Tuesday, December 14 from 10:00 – 11:50 AM**.
- **Weekly assignments**, worth 15 points each, will be taken from grading of selected homework problems or a quiz. Your ten best assignments count for 150 points in your course grade.

**Grading:** The points assigned during the semester add up to a total of 650 points for the course. Preliminary cutoffs are:

- 582 points (89.5%) guarantees an A in the course
- 517 points (79.5%) guarantees a B
- 452 points (69.5%) guarantees a C
- 387 points (59.5%) guarantees a D

**Homework:** To do well on my exams, you must be able to identify the correct technique *quickly* and use it smoothly, accurately, and efficiently. Regular practice is essential. I will assign homework problems from all sections of the text. Each week either the homework will be collected or I will give a quiz selected from the assigned problems. I typically will grade only a few problems, not announced in advance. Homework should be prepared on loose sheets with **no ragged edges** and **stapled**. Late homework is very rarely acceptable and only if approved by me **in advance**. No makeups on homework or quizzes are given. If you miss the assignment for a particular week, that will be one of your dropped scores. In order to receive full credit your work must be clear and legible, you must show all work, and explanations must be written out in correct English sentences.

**Partial Credit:** In differential equations, minor algebraic errors early in a problem can make an easy problem impossible, or they can change the problem entirely, so that the solution no longer illustrates your knowledge of whatever technique I was testing. My policy is that your work on exams will earn partial credit as long as it is 100% correct. At the point where your first error is made and you deviate from the correct solution, partial credit is no longer guaranteed. You may earn partial credit for solutions which are sufficiently close to the correct solution, but this is not guaranteed. In this course, getting the right answer matters a great deal, just as it will for your future employers.

**Drop Policy:** The last day to drop the course with an automatic grade of W is Friday, November 12.

**Attendance Policy:** Attendance is not part of your grade, but it is very highly recommended. You are responsible for the content of every lecture.

**Makeup exams:** Makeup exams will be given only for very serious and unavoidable extenuating circumstances and **only** if you notify me before or as soon as possible after the missed exam.

**Academic Dishonesty:** Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, multiple submissions, cheating on examinations, fabricating information, helping another person cheat, unauthorized advance access to examinations, altering or destroying the work of others, and fraudulently altering academic records) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript (F!), and being suspended from the University. Carefully read the OSU policy at [academicintegrity.okstate.edu](http://academicintegrity.okstate.edu).

**Boyce-DiPrima Ninth Edition Assignment List:** I assign homework from every section of the text that we cover. Assignments must be completed on 8.5 by 11 inch paper with *no ragged edges* and which is **stapled**. We will spot check a few selected exercises before returning the assignments. I highly recommend checking all of your answers in the back of the book and in the Student Solution Manual. H3.11 is section 3.11 from Stewart's *Calculus* on Hyperbolic Functions, available on our D2L page.

| Asn.          | Due Date | Sections                | Problems assigned                                 |
|---------------|----------|-------------------------|---|
| 1             | 9/2      | H3.11                   | 1, 3, 4, 6, 10, 16, 24a, 26, 29a, 31, 32, 45      |
|               |          | 1.1                     | 1, 5, 7, 9, 11, 15–20, 23, 24                     |
|               |          | 1.2                     | 1a, 2a, 3, 8, 9                                   |
| 2             | 9/9      | 2.1                     | 1c, 2c, 6c, 8c, 13, 14, 17, 19, 20, 31, 32        |
|               |          | 2.2                     | 1, 4, 5, 7, 8, 11, 16, 17, 19, 23, 26             |
| 3             | 9/16     | 2.3                     | 3, 4, 7, 12, 16, 19                               |
|               |          | 2.4                     | 2, 3, 4, 7, 8, 10, 13, 15, 21a-b, 22              |
| 4             | 9/23     | 2.5                     | 2, 3, 5, 9, 15, 18, 22                            |
|               |          | 2.6                     | 1, 2, 4, 10, 13, 16, 27, 30 (hint: clear denoms.) |
| <b>Exam 1</b> | 9/30     | Covers Assignments 1–4  |   |
| 5             | 10/7     | 3.1                     | 3, 6, 7, 10, 11, 12, 15, 17, 20                   |
|               |          | 3.2                     | 2, 3, 4, 5, 7, 8, 13, 14, 16, 22, 38, 39          |
| 6             | 10/14    | 3.3                     | 1, 5, 8, 11, 14, 17, 19, 21, 35, 36, 37           |
|               |          | 3.4                     | 3, 4, 5, 9, 12, 13, 16, 23, 25, 41, 42, 43        |
| 7             | 10/21    | 3.5                     | 1, 2, 3, 4, 5, 6, 13, 15, 17, 29                  |
|               |          | 3.7                     | 2, 3, 5, 6, 8, 11, 12, 17, 18                     |
| <b>Exam 2</b> | 10/28    | Covers Assignments 5–7  |   |
| 8             | 11/4     | 3.6                     | 2, 5, 7, 9, 13                                    |
|               |          | 3.8                     | 1, 3, 5, 7, 9, 11a, 12                            |
| 9             | 11/11    | 4.1                     | 4, 5, 7, 8, 11, 13                                |
|               |          | 4.2                     | 1, 4, 11, 14, 18, 32                              |
|               |          | 4.3                     | 1, 4, 7   |
| 10            | 11/18    | 6.1                     | 1, 5, 6, 10, 14, 15, 19, 22                       |
|               |          | 6.2                     | 2, 5, 12, 14, 16, 22, 28, 30, 33                  |
| 11            | 11/30    | 5.1                     | 1, 3, 5, 9, 13, 14, 17, 19, 23                    |
|               |          | 5.2                     | 1, 2, 6, 12, 16, 18                               |
| <b>Exam 3</b> | 12/2     | Covers Assignments 8–11 |   |
| 12            | 12/9     | 6.3                     | 1, 2, 4, 7, 10, 14, 17, 19, 20, 21, 30            |
|               |          | 6.4                     | 3, 5, 8   |
| <b>Final</b>  | 12/14    | 10–11:50 PM             | Comprehensive: Covers Assignments 1–12            |

**Boyce-DiPrima Eighth Edition Assignment List:** This is an accurate list of our homework problems with problem numbers corresponding to selections from the eighth edition of Boyce and DiPrima. A few problems not available in the eighth edition are listed in bold and copied below.

| Asn.          | Due Date | Sections                | Problems assigned  |
|---------------|----------|-------------------------|--|
| 1             | 9/2      | H3.11                   | 1, 3, 4, 6, 10, 16, 24a, 26, 29a, 31, 32, 45               |
|               |          | 1.1                     | 1, 5, 7, 9, 11, 15–20, 23, 24                              |
|               |          | 1.2                     | 1a, 2a, 3, 8, 9  |
| 2             | 9/9      | 2.1                     | 1c, 2c, 6c, 8c, 13, 14, 17, 19, 20, 31, 32                 |
|               |          | 2.2                     | 1, 4, 5, 7, 8, 11, 16, 17, 19, 23, 26                      |
| 3             | 9/16     | 2.3                     | 3, 4, 7, 12, 16, 19  |
|               |          | 2.4                     | 2, 3, 4, 7, 8, 10, 13, 15, 21a-b, 22                       |
| 4             | 9/23     | 2.5                     | 2, 3, 5, 9, 15, 18, 22                                     |
|               |          | 2.6                     | 1, 2, 4, 10, 13, 16, 27, 30 (hint: clear denoms.)          |
| <b>Exam 1</b> | 9/30     | Covers Assignments 1–4  |  |
| 5             | 10/7     | 3.1                     | 3, 6, 7, 10, 11, 12, 15, 17, 20                            |
|               |          | 3.2                     | 2, 3, 4, 5, 7, 8, 13, 14, 16, 21                           |
|               |          | 3.3                     | 24, 25   |
| 6             | 10/14    | 3.4                     | 1, 5, 8, 11, 14, 17, 19, 21, 39, 40, 41                    |
|               |          | 3.5                     | 3, 4, 5, 9, 12, 13, 16, 23, 25, 41, 42, also <b>3.5.43</b> |
| 7             | 10/21    | 3.6                     | 1, 2, 3, 4, 5, 6, 13, 15, 17, 29                           |
|               |          | 3.8                     | 2, 3, 5, 6, 8, 11, 12, 17, 18                              |
| <b>Exam 2</b> | 10/28    | Covers Assignments 5–7  |  |
| 8             | 11/4     | 3.7                     | 2, 5, 7, 9, 13   |
|               |          | 3.9                     | 1, 3, 5, 7, 9, 11a, 12                                     |
| 9             | 11/11    | 4.1                     | 4, 5, 7, 8, 11, 13   |
|               |          | 4.2                     | 1, 4, 11, 14, 18, 32                                       |
|               |          | 4.3                     | 1, 4, 7  |
| 10            | 11/18    | 6.1                     | 1, 5, 6, 10, 14, 15, 19, 22                                |
|               |          | 6.2                     | 2, 5, 12, 14, 16, 22, 28, 30, 33                           |
| 11            | 11/30    | 5.1                     | 1, 3, 5, 9, 13, 14, 17, 19, 23                             |
|               |          | 5.2                     | 1, 2, 6, 12, 16, 18  |
| <b>Exam 3</b> | 12/2     | Covers Assignments 8–11 |  |
| 12            | 12/9     | 6.3                     | 1, 2, 4, 8, 11, 13, 14, 15, 24, <b>6.3.7, 6.3.10</b>       |
|               |          | 6.4                     | 3, 5, 8  |
| <b>Final</b>  | 12/14    | 10–11:50 PM             | Comprehensive: Covers Assignments 1–12                     |

**3.5.43** Solve  $2t^2y'' - 5ty' + 5y = 0$ ,  $t > 0$ .

**6.3.7** Sketch the graph of the given function and express it in terms of unit step functions  $u_c(t)$ .

$$f(t) = \begin{cases} 0, & 0 \leq t < 3, \\ -2, & 3 \leq t < 5, \\ 2, & 5 \leq t < 7, \\ 1, & t \geq 7. \end{cases}$$

**6.3.10** Sketch the graph of the given function and express it in terms of unit step functions  $u_c(t)$ .

$$f(t) = \begin{cases} t^2, & 0 \leq t < 2, \\ 1, & t \geq 2. \end{cases}$$

**Tentative Course Calendar:** Here is a tentative calendar for the semester. This schedule is approximate and may be adjusted as the semester progresses. Section numbers refer to the ninth edition of Boyce and DiPrima.

| Week of       | Tuesday                        | Thursday                  | Notes         |
|---------------|--------------------------------|---------------------------|---------------|
| <b>Aug 23</b> | Intro, H3.11                   | 1.1, 1.2                  |               |
| <b>Aug 30</b> | 2.1, 2.2                       | 2.1, 2.2                  | PS 1 Due      |
| <b>Sep 6</b>  | 2.3, 2.4                       | 2.3, 2.4                  | PS 2 Due      |
| <b>Sep 13</b> | 2.5, 2.6                       | 2.5, 2.6                  | PS 3 Due      |
| <b>Sep 20</b> | 3.1,3.2                        | 3.1, 3.2                  | PS 4 Due      |
| <b>Sep 27</b> | 3.2, Review                    | <b>EXAM 1</b>             |               |
| <b>Oct 4</b>  | 3.3, 3.4                       | 3.3, 3.4                  | PS 5 Due      |
| <b>Oct 11</b> | 3.5, 3.7                       | 3.5, 3.7                  | PS 6 Due (FB) |
| <b>Oct 18</b> | 3.6, 3.8                       | 3.6, 3.8                  | PS 7 Due (HC) |
| <b>Oct 25</b> | 3.8, Review                    | <b>EXAM 2</b>             |               |
| <b>Nov 1</b>  | 4.1, 4.2                       | 4.2, 4.3                  | PS 8 Due      |
| <b>Nov 8</b>  | 6.1, 6.2                       | 6.1, 6.2                  | PS 9 Due (WD) |
| <b>Nov 15</b> | 5.1, 5.2                       | 5.1, 5.2                  | PS 10 Due     |
| <b>Nov 22</b> | 6.3, 6.4                       | <b>Thanksgiving break</b> |               |
| <b>Nov 29</b> | 6.4, Review, PS 11 Due         | <b>EXAM 3</b>             |               |
| <b>Dec 6</b>  | 6.3, 6.4                       | Review                    | PS 12 Due     |
| <b>Dec 13</b> | <b>Final Exam, 10–11:50 AM</b> |                           |               |