

**Professor's Address**

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Course Web Page: <http://www.math.missouri.edu/~carmen/Classes/>  
Department Web Page for Math 4100:  
<http://www.math.missouri.edu/courses/math-courses/math4100-hw.html>

**Textbooks**

- Elementary Differential Equations and Boundary Value Problems, by Boyce and Diprima, 8th Edition, John Wiley & Sons, 2007.
- Planar Systems of Differential Equations (Photocopies available in the Book Store.)

**Exams and Grades** There will be three hour exams (see the next page) and one final exam scheduled for Wednesday, May 14 8:00 – 10:00A.M.

(see <http://registrar.missouri.edu/classes-exams/final-exams.php>).

If, for reasons beyond your control, you cannot be in class the day of an exam, you must make arrangements *before* the date of the exam to take the exam at an alternate time. Each hour exam will count 100 points while the comprehensive final exam counts 150 points. Homework/Quizzes count 100 points. The listed homework assignments are incomplete; additional problems will be assigned. Course grades will be awarded using the plus-minus grading system. As a rough guide, my grading policy is approximated by the following ranges: 90% to 100% is an A, 80% to 89% a B, 60% to 79% a C, 50% to 59% a D and below 50% an F.

Quizzes and homework assignments to hand will be announced in class.

**Office Hours** Monday 4:00 and Wednesday 1:00 P.M. and by appointment. These times could change. If so, I will revise this document on the course web page. Please feel free to come to see me; I will try my best to help with all of your questions. I also will respond to e-mail.

**Prerequisites** If you are enrolled in this course and the MU systems shows that you do not satisfy the required prerequisite (which is a C or better in MATH 2300), the Mathematics Department will drop you from the class *after* the last day for add/drop has passed, at which time, you will not be able to add another course. It is your responsibility to provide appropriate documentation for satisfying prerequisites and to check that the corresponding documentation has been entered in the MU system.

| Order | Section and Title  | Homework Assignment                              |
|-------|--|--|
| 1     | 2.1 <i>Linear equations (1st order) with variable coefficients</i>               | 2(c),6(c),8(c),13,16                             |
| 2     | 2.2 <i>Separable equations</i>   | 3,6,7,10(a,c),22                                 |
| 3     | 2.3 <i>Modelling with first order equations</i>                                  | 1,3,7,21,23                                      |
| 4     | 2.3 (cont'd)   |  |
| 5     | 2.6 <i>Exact equations and integrating factors</i>                               | 3,5,11,12,19,29                                  |
| 6     | Catch up   |  |
| 7     | 3.1 <i>Homogeneous (2nd order) equations with constant coefficients</i>          | 7,14,17,20,23                                    |
| 8     | 3.2 <i>Fundamental solutions of linear homogeneous equations</i>                 | 4,8,12,13,15,16,17,19,22,23,26                   |
| 9     | 3.3 <i>Linear dependence and the Wronskian</i>                                   | 1,6,7,9,12,17,18,20,22                           |
| 10    | 3.4 <i>Complex roots of the characteristic equation</i>                          | 7,12,16,18,19,27                                 |
| 11    | 3.5 <i>Repeated roots; reduction of order</i>                                    | 1,2,7,12,15,25,32                                |
| 12    | <b>Exam 1</b>  |  |
| 13    | 3.6/3.7 <i>Undetermined Coefficients &amp; Variation of parameters</i>           | 2,4,8,16,17/7,12,13,17                           |
| 14    | 3.8/3.9 <i>Mechanical and electrical vibrations (mechanical vibrations only)</i> | (3.8) 7,9,13,17,26(a,b)                          |
| 14    | 3.8/3.9 (cont'd)   | (3.9) 5,7,11,12                                  |
| 16    | Catch up   |  |
| 17    | 6.1 <i>Definition of Laplace Transform</i>                                       | 1,2,3,5(c),7,13,14,16,18                         |
| 18    | 6.2 <i>Solutions of initial value problems</i>                                   | 7,8,9,11,20,21,24                                |
| 19    | 6.3 <i>Step functions</i>  | 1,3,7,9,14,16,17,24,25                           |
| 20    | 6.4 <i>Differential equations with discontinuous forcing functions</i>           | 1,2,4,6,8,11,14,16(a,b)                          |
| 21    | 6.5 <i>Impulse functions</i>   | 1,3,5,11,14(a,b)                                 |
| 22    | 6.6 <i>The convolution integral</i>  | 4,6,8,10,13,15                                   |
| 23    | <b>Exam 2</b>  |  |
| 24    | 8.1 <i>The Euler or tangent line method</i>                                      | 3(a,b,c,d),4(a,b,c,d),9(1,b,c,d),22              |
| 25    | 8.1/8.2 (cont'd)   |  |
| 26    | Catch up   |  |
| 28    | $2 \times 2$ <i>Matrix Theory</i>  | p. 5; 1.1–1.2,                                   |
| 14    | (cont'd)   | p. 14; 2.1,2.2(1,4,6,7),2.3(1),2.4(3),2.5(1,2,3) |
| 29    | $2 \times 2$ <i>ODEs</i>   | p. 21; 3.1,3.3,3.4                               |
| 30    | <i>Case I</i>  | p. 23; 4.1,4.2,4.4                               |
| 31    | <i>Case II</i>   | p. 26; 5.1,5.2,5.3                               |
| 32    | <i>Case III</i>  | p. 29; 6.1,6.2,6.5                               |
| 33    | <b>Exam 3</b>  |  |
| 34    | <i>Nonhomogeneous systems</i>  | p. 36; 2.6(1,3),7.1,7.3,7.4                      |
| 35    | <i>Qualitative methods</i>   | p. 45; 8.1,8.2,8.3                               |
| 36    | <i>Linearization</i>   | p. 54; 9.1,9.2,9.3,9.4 9.5                       |

**Notes on Syllabus** The topics are listed in the order we will cover them. Most items will take one class day to cover. Extra class days will be used for catchup and review. You will be able to stay with the schedule by coming to class. The exact dates of the hour exams will be announced at least one week in advance.

**Common grading policy for Math 4100:**

There will be 3 midterm exams (100 points each), one comprehensive final exam (150 points), and homework/quizzes (100 points); therefore your course grade will be computed on the total of 550 points.

**Operating Procedure** The most important features of the theory will be discussed in class and an attempt will be made to answer all questions. In order to be successful, you are strongly encouraged to take part in the class discussions. But, experience dictates that *the most important key to success* is the completion of all homework assignments. There are at least two good reasons for this: Exam questions will often be taken directly from the homework and, by doing the homework assignments prior to the class meetings, you can take full advantage of the class discussions. In this regard, please note that there are very few class hours. If you remove exam days and holidays there are approximately 40 class hours. In the real world, this is just one week of work! Clearly, it is impossible to cover every detail of what you need to know during class meetings. To master the course, you must learn most of the material outside of class.

**Feedback** I sincerely want every member of the class to learn as much as possible about the wonderful subject of differential equations. I welcome constructive criticism of the way the course is conducted. Your evaluations of the course will be requested near the end of the semester.

**Disabilities** If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class, or at my office. To request academic accommodations (for example, a note taker), students must also register with Disability Services (<http://web.missouri.edu/~accesscm>), AO38 Brady Commons, 882-4696 or 882-8054 TTY. It is the campus office responsible for reviewing documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. Another resource, MU's Adaptive Computing Technology Center (<http://iatservices.missouri.edu/adaptive>), 884-2828, is available to provide computing assistance to students with disabilities. For more information about the rights of people with disabilities, please see [ada.missouri.edu](http://ada.missouri.edu) or call 884-7278.

**Academic Honesty** Academic honesty is fundamental to the activities and principles of a University. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. When in doubt about plagiarism or collaboration, consult the course instructor. The academic community regards academic dishonesty as an extremely serious matter, with serious consequences that range from probation to expulsion.

If at any time you have questions about this policy, please ask.

**Complaints** If you have communication (or other problems) with your instructor, you can report them to Professor Konstantin Makarov (Director of Undergraduate Studies) either by phone (882-4898) or by e-mail ([makarov@math.missouri.edu](mailto:makarov@math.missouri.edu)).