

MATH 20D, WINTER 2010
INTRODUCTION TO DIFFERENTIAL EQUATIONS
MWF 2:00PM - 2:50PM, LEDDEN AUDITORIUM (FORMERLY H&SS 2250)
<http://www.math.ucsd.edu/~mleok/courses/math20d/>

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|--|--|---|--|--|--|
| INSTRUCTOR | <p>Prof. Melvin Leok Office: AP&M 5763 E-mail: mleok@math.ucsd.edu Office Phone:(858)534-2126 Office Hours: MW 1:00pm-1:50pm, or by appointment</p> | | | | |
| TEACHING ASSISTANTS | <table><tr><td><p>Mary Radcliffe Sections: B01 (4:00pm, WLH 2206). Office: AP&M 6436 Email: mradclif@math.ucsd.edu Office Phone:(858)534-6137</p></td><td><p>Alexander Young Sections: B02 (5:00pm, WLH 2208), B03 (6:00pm, WLH 2209), B04 (7:00pm, WLH 2115). Office: AP&M 6414 Email: aayoung@math.ucsd.edu Office Phone:(858)534-4368</p></td></tr><tr><td><p>Asif Shakeel Sections: B05 (8:00pm, WLH 2112), B06 (9:00pm, WLH 2112), B07 (5:00pm, APM B402A). Office: AP&M 6434 Email: ashakeel@math.ucsd.edu Office Phone:(858)534-9069</p></td><td></td></tr></table> | <p>Mary Radcliffe Sections: B01 (4:00pm, WLH 2206). Office: AP&M 6436 Email: mradclif@math.ucsd.edu Office Phone:(858)534-6137</p> | <p>Alexander Young Sections: B02 (5:00pm, WLH 2208), B03 (6:00pm, WLH 2209), B04 (7:00pm, WLH 2115). Office: AP&M 6414 Email: aayoung@math.ucsd.edu Office Phone:(858)534-4368</p> | <p>Asif Shakeel Sections: B05 (8:00pm, WLH 2112), B06 (9:00pm, WLH 2112), B07 (5:00pm, APM B402A). Office: AP&M 6434 Email: ashakeel@math.ucsd.edu Office Phone:(858)534-9069</p> | |
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| COURSE DESCRIPTION | <p>Ordinary differential equations: exact, separable, and linear; constant coefficients, undetermined coefficients, variations of parameters. Systems. Series solutions. Laplace transforms. Techniques for engineering sciences. Computing symbolic and graphical solutions using MATLAB. 4 credit hours.</p> | | | | |
| PREREQUISITES | <p>Math. 20C (or Math. 21C) with a grade of C or better</p> | | | | |
| TEXTBOOK | <p>Elementary Differential Equations, 9th edition, William E. Boyce & Richard C. DiPrima, Wiley, 2008, ISBN: 047003940X.</p> | | | | |
| MATERIAL | <p>We will cover parts of Chapters 1, 2, 3, 5, 6 and 7 of Boyce & DiPrima.</p> | | | | |
| READING | <p>Reading the sections of the textbook corresponding to the assigned homework exercises is considered part of the homework assignment; you are responsible for material in the assigned reading <i>irrespective of whether or not it was discussed in the lecture</i>. It is expected that you read the assigned material in advance of each lecture.</p> | | | | |
| CALCULATORS | <p>The use of calculators, or any other computational aids, such as abacuses, slide rules, cell phones, PDAs, computers, is prohibited during the exams. Graphing calculators (such as the TI-86 or TI-89) may be useful in checking solutions to some of the homework problems, but they are not required for the course.</p> | | | | |
| HOMEWORK | <p>Homework problems will be assigned on the course webpage, and will be collected at the beginning of the discussion sections (or by 11:00am in the homework drop box) on the indicated due date. You may work together with your classmates on your homework and/or ask the instructors, the TA's, or tutors in the calculus lab for help on assigned homework problems. However, the work you turn in should be your own. Your homework grade will be based on the best six (6) of eight (8) homework assignments. <i>No late homework assignments will be accepted.</i> Please adhere to the following neatness guidelines for homework that you turn in to be graded; homework not conforming to these guidelines will not receive full credit and may not be graded at all.</p> | | | | |

- Use clean paper (graphed or lined is okay) that is not torn from a spiral notebook.
- Write your name, ID number, and section clearly on the front page of your completed assignment.
- Clearly number each solution and present them in numerical order.
- Leave at least one line of space between each problem.
- Write clearly and legibly.

MATLAB ASSIGNMENTS

Math 20D has a computational component based on MATLAB. There will be four (4) MATLAB assignments which will be due on alternate Fridays at 6pm in the homework drop boxes on the 6th floor of APM, as specified in the course calendar. The MATLAB assignments may be found on the MATLAB assignment page. Your MATLAB lab assignment grade will be based on the best three (3) of four (4) MATLAB lab assignments. No late MATLAB lab assignments will be accepted. More complete information regarding the computer labs may be found at <http://www.math.ucsd.edu/~math20d/>.

MIDTERM EXAMS

There will be two midterm exams given during the regular lecture hour on Friday; see the course calendar for the specific dates. **There will be no makeup exams.** You may bring one 8.5 by 11 inch sheet of notes with you to each midterm exam. No calculators will be allowed during the midterm exams.

FINAL EXAM

The final examination will be held at the following time: 3:00pm - 6:00pm, Monday, March 15, 2010. You may bring one 8.5 by 11 inch sheet of notes with you to each midterm exam. No calculators will be allowed during the final exam. Please note: It is your responsibility to ensure that you do not have a schedule conflict involving the final examination; you should not enroll in this class if you cannot sit for the final examination at its scheduled time.

REGRADES

Midterm exams will be returned in the discussion sections. If you wish to have your exam regraded, you must observe the following rules:

- Return your exam immediately to your TA. Regrade requests will not be considered once the quiz or exam leaves the room.
- If you disagree with the TA's answer to your regrade request, you may ask for the instructor to review it. To do this, you must:
 - Return your quiz or exam immediately to your TA and ask that they forward it to the instructor.
 - Instructor review requests will not be considered once the quiz or exam leaves the room.
 - An Instructor review may result in a re-marking of the entire quiz or exam, in which case *the grade you earned could be lower than originally recorded.*
- If you do not retrieve your exam during discussion section, you must arrange to pick it up from your TA within one week after it was returned in order for any regrade request to be considered.

GRADING

Your course grade will be determined by your cumulative average at the end of the term and will be based on the following scale:

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| A+ | A | A- | B+ | B | B- | C+ | C | C- | D |
| 97 | 93 | 90 | 87 | 83 | 80 | 77 | 73 | 70 | 60 |

We may adjust the scale to be more lenient, but we guarantee that the grade corresponding to a given percentage will not be lower than specified by the above scale. Your cumulative average will be the best of the following two weighted averages:

- 10% Homework (best 6 of 8), 10% Lab (4% assignments + 6% quiz), 20% Midterm Exam I, 20% Midterm Exam II, 40% Final Exam
- 10% Homework (best 6 of 8), 10% Lab (4% assignments + 6% quiz), 20% Best Midterm Exam, 60% Final Exam

In addition, **you must pass the final examination in order to pass the course.** **Note:** Since there are no makeup exams, if you miss a midterm exam for any reason, your course grade will be computed with the final exam counting 60% of your weighted average.

Please remember that grades are not negotiable. Grades are earned on the basis of performance, not given on the basis of effort or need. Your grade represents your performance in this course, not your potential as a student or a person. I do not respond to email about grades.

ADDITIONAL POLICIES

- In order to receive full credit on exams and homework you must show all work in a clear and coherent manner. In particular, correct answers not fully supported by explanations using complete sentences, where appropriate, will not receive full credit. It is your responsibility to present your solutions in an easily understood manner.
- Please keep all your exams and homeworks; if you believe there has been an error in the recording of your grades they are the only way to validate your claim.
- If you miss an appointment for a meeting outside regular office hours without giving at least 12 hours notice by email, you lose the privilege of requesting another appointment for the rest of the quarter, and may only avail yourself of the regularly scheduled office hours.

EMAIL POLICIES

The following guidelines may appear draconian, but are essential for the efficient management of a course of this size.

- I will not respond to emails which are composed in an unprofessional manner, or which violates basic email etiquette. Think professional business letter to a potential employer, as opposed to a text message to your friend.
- Before sending an email inquiry, please carefully review the syllabus and course website to ensure that your question has not been addressed there. Questions that have been addressed in the syllabus or on the course website will receive responses that redirect you back to the appropriate resource.
- I do not offer immediate round the clock technical support, please plan ahead accordingly. I will try to respond to emails within 36 hours during the week, and within 72 hours during the weekend.
- Emailed questions should primarily be limited to clarification of the homework questions, and I will defer questions that require more substantial responses, in particular programming questions, to my office hours.

ACADEMIC DISHONESTY

Academic dishonesty is considered a serious offense at UCSD. Students caught cheating will face an administrative sanction which may include suspension or expulsion from the university. It is in your best interest to maintain your integrity. Suspected violations will be investigated in accordance with university statute and referred to the academic integrity office.

TENTATIVE
CALENDAR

This calendar is subject to revision during the quarter. The section references are only a guide, and we may deviate from it.

| Date | Sections Covered |
|-------------|---|
| Jan. 4 | 1.1, 1.2, 1.3: Introduction; Classification and Modeling |
| Jan. 6 | 2.1: Linear Equations; Method of Integrating Factors |
| Jan. 8 | 2.2: Separable Equations |
| Jan. 11 | 2.3, 2.4: First Order Modeling, Linear vs. Nonlinear |
| Jan. 13 | 2.5: Autonomous Equations and Population Dynamics |
| Jan. 15 | 2.6: Exact Equations and Integrating Factors |
| Jan. 18 | Martin Luther King, Jr. Holiday |
| Jan. 20 | 3.1, 3.2: Linear Homogeneous Equations; Wronskian |
| Jan. 22 | 3.3: Complex Roots of the Characteristic Equation |
| Jan. 25 | 3.4: Repeated Roots; Reduction of Order |
| Jan. 27 | Review |
| Jan. 29 | Midterm Exam 1 |
| Feb. 1 | 3.5: Nonhomogeneous Equations; Undetermined Coefficients |
| Feb. 3 | 3.6: Variation of Parameters |
| Feb. 5 | 3.7: Mechanical and Electrical Vibrations |
| Feb. 8 | 7.1, 7.2: Systems of First Order Equations; Matrix Review |
| Feb. 10 | 7.3: Linear Algebraic Equations; Eigenvalues and Eigenvectors |
| Feb. 12 | 7.4: Theory of Systems of First Order Linear Equations |
| Feb. 15 | President's Day Holiday |
| Feb. 17 | 7.5: Homogeneous Linear Systems with Constant Coefficients |
| Feb. 19 | 7.6: Complex Eigenvalues |
| Feb. 22 | 7.7, 7.8: Fundamental Matrices, Repeated Eigenvalues |
| Feb. 24 | Review |
| Feb. 26 | Midterm Exam 2 |
| Mar. 1 | 7.9: Nonhomogeneous Linear Systems |
| Mar. 3 | 5.1, 5.2, 5.3: Series Solutions Near an Ordinary Point |
| Mar. 5 | 6.1, 6.2: The Laplace Transformation, Solutions of Initial Value Problems |
| Mar. 8 | 6.3, 6.4: The Step Functions; Discontinuous Forcing Functions |
| Mar. 10 | 6.5: Impulse Functions |
| Mar. 12 | Review |
| Mar. 15 | Final Exam |