SYLLABUS - MATH 3200: Elementary Differential Equations

Fall Semester – 2010
Tu/Th 2:30pm-3:45pm
Professor: Weldon A. Lodwick
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Telephone: 556-8462 Department: 556-8442

E-Mail: Weldon.Lodwick@ucdenver.edu
Web Site: http://www-math.cudenver.edu/~wlodwick
Office Hours: Tu 4pm-5pm
Wed 10am-11am
Th 11:15am-12:15pm
Other times by arrangement

Students with Disabilities: If you have a disability that requires accommodation in this course, please see me as soon as possible. I am happy to make appropriate accommodations, provided you are registered with the UCD Office of Disability Resources and Services (DRS). The office is located at NC2514, telephone number: (303)556-3450.
Cell Phones: You are to turn off your cell phones prior to entering class.

TENTATIVE CONTENT OUTLINE

We will cover the following sections:
1.1-1.3, 2.1-2.8, 2.10, 3.1-3.10, 4.1-4.8, 5.1-5.7
We may skip one or more of the following sections depending on where we are in terms of our schedule (3.9, 3.10, 4.8, 5.5). This material represents the basic core topics and those most important in applications. In order to cover it all, we will have to average a little better than one section per class. Each chapter after Chapter 1 has a “Project Section.” These sections are assigned as optional reading assignments, but will not be covered in class or on exams.

The lectures, material in the book, exams and quizzes will contain a mixture of theory, applications and computations. The beauty of this subject is the way that the theory, applications and the computational components interact.

There are three evaluative criteria – in-class exams (there are two tests and one comprehensive final), in-class quizzes on Tuesdays during the last 10 minutes of class (two short problems and a short extra credit problem taken directly from the even-numbered problems in the text), and either one long project or two short projects. The two short projects are to be taken from the “Project” section of the text and needs to be 2.5 to 5 pages long, each. The one long project will be 5 to 10 pages long and would be over a topic you and I have discussed. If you decide on two short projects, Project 1 is due October 15th at 5pm and December 10th at
5pm. If you decide on one long project, it is due December 10th at 5pm. In either case, you are to write up a project proposal (for each project). You may work in teams of no more than three people. Team projects have a more ample scope of work. The long Project and Project 1 proposals are due by September 9th at 5pm and Project 2 proposal is due by October 29th at 5pm.

The quiz and exam due dates are given below. Quiz sections will be two problems selected from the sections covered since the last quiz (plus one short optional extra credit problem). You must show all work on exams, quizzes and the project sufficient for me to understand how your solutions were obtained. Exam and quiz dates are firm, and if you have a problem, please contact me beforehand. Each quiz is worth 10 points with each of the two problems worth 5 points. I will have one short extra problem worth 2.5 points on each quiz so there is no make-up quiz that I will give. The make-up is the extra problem. There are only 50 points possible from quizzes so that once you hit your 50 points total, quizzes are optional.

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<tr>
<th>QUIZ number</th>
<th>1</th>
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<th>7</th>
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<th>10</th>
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<tbody>
<tr>
<td>Sections due confirmed</td>
<td>8/31, 9/7, 9/14, 9/21, 10/12, 10/19, 10/26, 11/2, 11/9, 12/7</td>
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<td>EXAM dates</td>
<td>1</td>
<td>2</td>
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<td>9/30</td>
<td>11/18</td>
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<td>REVIEW for Final Exam</td>
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<td></td>
<td>12/10 2-3:30pm CU-Denver Bldg, 6th Fl.</td>
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Exam 1 will cover Chapters 1-2 (whole class period)
Exam 2 will cover Chapters 3-4 (whole class period)
**Final Exam** will cover Chapters 1-5 (roughly 50 points from Chapters 1-2, 50 points from Chapters 3-4, and 50 points from Chapter 5) – 2 hours
The grading scheme for the course is outlined below. The final grade is based on the standard percentage scale given below.

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<thead>
<tr>
<th></th>
<th>GRADING</th>
<th>Points</th>
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<tbody>
<tr>
<td>Project report</td>
<td>2x50pts or 1x100</td>
<td>100</td>
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<tr>
<td>Quizzes</td>
<td>10x5pts</td>
<td>50</td>
</tr>
<tr>
<td>Exams</td>
<td>2x100 + 1x150</td>
<td>350</td>
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<tr>
<td><strong>Total</strong></td>
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<td>500</td>
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I do give +/- unless your school (engineering for example) does not recognize +/--grades in which case I grade without +/-.

A = 98%-100%  B+ = 88%-90%  C+ = 78% - 80%  D+ = 68% - 70%
A = 94%- 97%  B = 84%-87%  C = 74% - 77%  D = 64% - 67%
A- = 91%- 93%  B- = 81%-83%  C- = 71% - 73%  D- = 60% - 63%
F less than 60%
Note: If your school (for example the School of Engineering) does **not** recognize +/-, then an A is 93% to 100%, B is 82.5% to 92.9%, C is 72.5% to 82.4%, D is 60% to 72.4% and an F is less than 60%.

**General advice:** Keep all materials that I turn back in case you think I have not credited you with the points you earned. I can only correct your score if you have what I have turned back to you. It is a good idea to xerox anything that you turn in just in case I lose what you turn in. Please check to make sure that the points you earned are the points I have recorded. The statistics that I have read about correctness of professors in grading and recording grades state that there is a 6% error rate. Please make sure that I have correctly graded and recorded your points.

**Advice on exam taking:** Some exams may be longer (or more demanding or both) than what you are accustomed. Thus, it is wise (imperative) for you take exams as follows. Do all the problems you can do first. Don't waste too much time on making sure that you have done your arithmetic correctly since arithmetic mistakes are usually discounted at half a point per mistake unless your arithmetic mistake totally trivializes the problem in which case the deduction will be severe. That is, you should work on generating the most number of points per unit of time – the maximum number of points per minute.

**POLICIES**

**Drops and incomplete grades:** See Dean’s Office Announcements below for the relevant dates with respect to dropping this course. The incomplete policy of the Department Mathematics and Statistical Sciences and the College of Liberal Arts and Sciences is strictly enforced. Incomplete grades are given only in situations in which a student who has been in good standing all semester, is prevented from completing a course assignment (for example the final exam) due to circumstances beyond her/his control (for example, hospitalization, jury duty, revised job assignments, death in the family).

**Missing Examinations:** If you miss a test for acceptable reasons and we have met before the exam and agreed that indeed this is the case you will be given a make-up exam. You are to take the final exam on the given date. If you have more than two final exams on date of our final, this will have to be resolved at least one week in advance of our final exam. There are cases where an exam is missed without your being able to notify me ahead of time. These will be exceptional cases and we can work these out as long as your reasons are legitimate.

**Legitimate Excuses:** Legitimate excuses for missing exams are for some situations that are beyond your control. You may be required to produce official, signed documentation. If you are needed in a wedding, for example, you must talk to me prior to the (blessed) event. If you are legally arrested, then this
is not a legitimate excuse. For matters that are within your control, the general rule is that it is not excused. However, talk to me prior to the event. NOTE: There are no make-up quizzes regardless of the excuse. The make-up is built into the extra problem I am giving with each quiz. Again, there are no make-up quizzes.

**Tentative Topic Coverage Schedule**

<table>
<thead>
<tr>
<th>WEEK OF</th>
<th>SECTIONS</th>
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<tbody>
<tr>
<td>August 24</td>
<td>1.1-1.2</td>
</tr>
<tr>
<td>August 31</td>
<td>Quiz 1, 1.3.2.1, 2.2</td>
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<tr>
<td>September 7</td>
<td>Quiz 2, 2.3-2.5, Project/Project 1 proposal</td>
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<tr>
<td>September 14</td>
<td>Quiz 3, 2.6-2.8</td>
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<tr>
<td>September 21</td>
<td>Quiz 4, 2.10, 3.1, 3.2</td>
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<tr>
<td>September 28</td>
<td>3.3, Exam 1 (Chapters 1&amp;2)</td>
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<tr>
<td>October 5</td>
<td>3.4-3.6</td>
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<td>October 12</td>
<td>Quiz 5, 3.7-3.9, Project 1 report</td>
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<tr>
<td>October 19</td>
<td>Quiz 6, 3.10, 4.1, 4.2</td>
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<tr>
<td>October 26</td>
<td>Quiz 7, 4.3-4.5, Project 2 proposal</td>
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<tr>
<td>November 2</td>
<td>Quiz 8, 4.6-4.8</td>
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<tr>
<td>November 9</td>
<td>Quiz 9, 5.1-5.3</td>
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<tr>
<td>November 16</td>
<td>5.6, Exam 2 (Chapters 3&amp;4)</td>
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<tr>
<td>November 30</td>
<td>5.5-5.7</td>
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<tr>
<td>December 7</td>
<td>Catch up, Project 2, Project report, Review</td>
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<tr>
<td>December 14</td>
<td>Final (Chapters 1-5)</td>
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**DIFFERENTIAL EQUATIONS MODELING PROJECT:** A class project is worth 100 points (either 2X50 or 1X100) and consists of two parts: (i) a formal proposal, (ii) a written final project report worth 100 points. Project contents and expectations are found below.

**PROJECT INSTRUCTIONS**

Projects may be done individually or in teams of up to three persons. If you decide to work in a team, the scope of the project is enlarged accordingly.

**General Goals and Objectives** – The primary goal of each project is to have fun and to learn how to apply ordinary differential equations to solve actual problems. Other goals include:
- understanding the process of taking a (real world) problem from its initial description to its solution; that is, understanding the mathematical modeling process
- using research facilities such as the computer network, the web, the library
- understanding the process of problem solving
- project management and collaborative team work
- technical communication of a proposed study topic and its results

To achieve our project goals, your contribution will have specific sub-tasks (see below) culminating in a final project report. Any a’priori difficulties with the
materials and/or team member(s) need to be brought to my attention as soon as possible after attempts on your team's part. Problems associated with a team member not contributing their fair share toward the project research and report (failing to complete the tasks as outlined in the "division of labor" agreement) will be resolved, all else fails, by removing the member from the team. A revised project proposal will need to be written.

**Project Proposal** - This is a formal paper written on a word processor and printed out with a maximum of two pages (one page is preferable) describing what you propose to do for your project. The format is that of an outline with as much detail as possible. Include relevant references you have already examined. The main criterion that I will use to evaluate your proposal is how well you have thought out what you intend to do. It may be that the project is too complex for you to complete in one semester or too simple. If this is the case, I will talk to you (your group) and we will discuss how to adjust the project. Besides the technical information, you must include a breakdown of the project into sub-tasks, dates for completion of the subtasks and the person(s) responsible for completing each of the sub-tasks. This is the **milestone/schedule of work and division of labor** assigned for each team member. The division of labor must be fair and is your contract with the team. In particular, a project proposal consists of the following components as a minimum:

1. Title
2. Names of the team members
3. Objective(s) of the project
4. Project description
5. Milestone and division of labor
6. Outcome – what are your "deliverables"? Outcomes are the completion of the components of the milestones.

**Final Report** - This is your main contribution. Your English must be correct and polished. This is a formal document and while most of your grade is for the content, format, spelling, grammar, and style do matter. Please turn in two copies, one for my files and one that I will mark up and return to you.

**Project Selection**

Of course, whatever project you select to do must involve differential equations. It may be one of three types:

1. The use or creation of a computer system to solve a differential equation model. Here the focus is on the computation aspect of differential equations as opposed to the model you are using the computer system to solve. For example, you might develop a computerized model to predict the elk population in a particular wilderness area given the number of hunting licenses and predators. You are encouraged to pull programs from the web and run them locally.

2. The development of and solution to a particular differential equation model. For example, you might want to model the population growth in Denver between now and 2010, or you might want to model the air pollution in Denver, or develop a model for the snow-melt along the Front Range.
3. A survey of differential equations used in a particular discipline. For example, you might want to find out what are some of the differential equations models (some – of course not all) being used in civil engineering, physics, chemistry, aerospace, or electrical engineering (e.g., circuits).

Two teams might want to pair up where one would do a type (3) project and another team would do the associated type (1) project.

**Guidelines for the Final Written Report**

The general style must be one of a formal document. One good technical guide is *Elements of Style* by Strunk and White. It is imperative that each report be written clearly and with proper English in addition to correct mathematics.

**Form** – The overall report should have the following type of content:

**Introduction:** Write a succinct description of the problem area and relation to the topics to be covered. Guidance should be given to prepare the reader for what follows in the body of the report.

**Background:** This section may be viewed as a technical introduction with citation that gives a review of the relevant literature. Each reference should have a citation in the text; however, you may cite references not in your report that you investigated but determined to be irrelevant, though helpful to others that might want to follow in your footsteps.

**Main results:** This is your principle contribution. You might want to divide this section into something like the following:

1. Summary table (where applicable)
2. Analysis and solutions

**Areas of further study:** Include things you wish you could/would explore given more time and energy. What advice would your team give to another team that would pick up your research?

**Appendices:** Use this for extended background or lengthy proofs, and computer listings that would interfere with the flow of the text. In addition, put the original approved project proposal as the last section of the appendices.

**Bibliography:** Use accepted formal format.

**Criteria on which projects will be evaluated:**

1. Form and style – 15%
   a. Neatness – 5%. A word processor needs to be used.
   b. Adherence to standard forms including bibliography, footnotes, page numbering - 5%.
   c. Correct English usage – 5%. Correct spelling and grammar must be used.

2. Content – 85%
   a. “Value added” – 20%. What has the report added to the material you researched? How has your group transformed what it researched into something understood for yourselves as evidenced by what was written? If it is a straight “regurgitation,” then no “value” has been added. What did your group add to the material that had not already been done in quite the way that your group approached it? If your group has added insight to the way it presented the material or the
way it approached the material, then this is “value added.” This might be a new insight, a clearer way of presenting the topic, an original discovery. It might be that by adding tables, syntheses or illustrations that pulls together diverse material, the report clarifies the concepts in a new way. This is “value added.”

b. Level of difficulty – 15% bravery, depth

c. Clarity and thoroughness – 20%. How clear was the project report? Is the report self-contained and covers all aspects of what was set out in the proposal? Did the report cover enough material to make it complete?

d. Success – 20%. How successful was your group in understanding, in articulating, in solving the problem, in obtaining (correct) results from the computer program? How successful was your group in meeting its objectives, its milestones?

e. Creativity – 10%. My subjective judgment

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**DEAN’s OFFICE ANNOUNCEMENTS**

**Fall 2010 CLAS Academic Policies**

The following policies pertain to all students and are strictly adhered to by the College of Liberal Arts and Sciences (CLAS).

- Every student MUST check and verify their schedule prior to the published drop/add deadlines. Failure to verify a schedule is not sufficient reason to justify a late add or drop later in the semester.

- CLAS students must use their email.ucdenver.edu email address. Email is the official method of communication for all University of Colorado Denver business. All email correspondence will take place using your UCDHSC email address. Go to [http://www.ucdenver.edu/student-services/resources/registrar/students/policies/Pages/EmailPolicy.aspx](http://www.ucdenver.edu/student-services/resources/registrar/students/policies/Pages/EmailPolicy.aspx) to activate your email address.

- Students are **NOT automatically added** to a course off a wait list after wait lists are dropped. If a student is told by a faculty member that they will be added off the wait list, **it is the responsibility of the student to complete the proper paperwork to add a course.**

- Students are **not automatically notified** if they are added to a class from a wait-list. Again, it is the responsibility of the student to verify their schedule prior to any official dates to drop or add courses.

- Students must complete and submit a drop/add form to make any schedule changes. **Students are not automatically dropped from a class if they never attended, stopped attending or do not make tuition payments.**

- Late adds will be approved only when circumstances surrounding the late add are beyond the student’s control and can be documented independently. This will require a petition and documentation from the student. Please note that the signature of a faculty member on an add form
does not guarantee that a late add petition will be approved. Undergraduates should contact the Advising office and Graduate students should contact the Dean’s office to petition for a late add.

- Late drops will be approved only when circumstances surrounding the late drop have arisen after the published drop deadlines, are beyond the student’s control, and can be documented independently. This will require a petition and documentation from the student. Pre-existing circumstances (circumstances that existed prior to the published drop deadlines) regarding illness, work, family, or other confounding issues will not be considered adequate reason to drop or withdraw from courses after the published University and/or College drop deadlines. Please note that the signature of a faculty member does not guarantee that a late drop petition will be approved. Undergraduates should contact the Advising office and Graduate students should contact the Dean’s office to petition for a late drop.

- Undergraduate students wishing to graduate in fall of 2010 must meet with their academic advisor and complete their graduation application and intent to graduate form by 5 PM on September 8, 2010. You can obtain an application ONLY after meeting with your academic advisor so make your appointment early. There are no exceptions to this policy or date.

- Graduate students wishing to graduate in fall semester 2010 must complete their Intent to Graduate form and have a Request for Admissions to Candidacy on file with the CLAS Dean’s office no later than 5 PM, September 8, 2010.

- Students are responsible for completing financial arrangements with financial aid, family, scholarships, etc. to pay their tuition. Students will be responsible for all tuition and fees for courses they do not officially drop using proper drop/add procedures and forms. Students who drop after the published drop/add period will not be eligible for a refund of the COF hours or tuition.

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### Important Dates

- **August 23, 2010**: First day of Class
- **August 29, 2010**: Last day to add a class or be added to a wait list for a class using the UCDAccess portal. Please note that if your course does not appear as “enrolled” on your schedule you are not enrolled in the class.
- **August 30, 2010**: LAST DAY TO DROP WITHOUT DROP CHARGE – THIS INCLUDES SECTION CHANGES.
- **August 30, 2010**: Wait Lists are dropped. Any student who was not added to a course automatically from the wait list by this date and time MUST complete a schedule adjustment form to be added to the class. Students are NOT automatically added to the class from the wait list after
this date and time. If your name is not on the official student roster, you are not registered for the course.

- **August 31, 2010:** First day instructor may approve request to add a student to a course with a Schedule Adjustment Form. (Late start classes may be added up until the day the class starts).

- **September 8, 2010:** Census date.

- **September 8, 2010 at 5 PM:** Last day to add structured courses using a schedule adjustment form with instructor signature without a written petition for a late add. *This is an absolute deadline and is treated as such.* This deadline does not apply to independent study, internships, project hours, thesis hours, dissertation hours, and late-starting modular courses.

- **September 8, 2010 at 5 PM:** Last day to drop a fall 2010 course or completely withdraw from all fall 2010 courses with a tuition adjustment minus the drop charge and no transcript notation – this includes section changes. Drops after this date will appear on your transcript. Drops will require instructor approval and withdraw from all classes requires a dean’s signature. *This is an absolute deadline and is treated as such.*

- **September 8, 2010 at 5 PM:** Last day to request pass/fail or no credit option for a course.

- **September 8, 2010 at 5 PM:** Last day to for a graduate student to register for a Candidate for Degree.

- **September 8, 2010 at 5 PM:** Last day for a Ph.D. student to petition for a reduction in hours.

- **September 8, 2010 at 5 PM:** Last day to apply for fall 2010 graduation. Undergraduates must make an appointment and see your academic advisor before this date to apply for graduation if you are an undergraduate; graduate students must complete the intent to graduate and candidate for degree form.

- **September 6, 2010:** Labor Day (campus closed/ no classes)

- **September 20-29, 2010:** Faculty can use the early alert system.

- **November 1, 2010 at 5 PM:** Last day for students to drop or withdraw from all classes without approval from the student’s academic Dean.

- **November 15, 2010 at 5 PM:** Last day for **CLAS students** can obtain dean’s permission to drop or withdraw without a full petition. *This is treated as an absolute deadline.*

- After **November 15, 2015** all schedule changes require a full petition. Undergraduates should contact their CLAS advisor, graduate students should contact the dean’s office.

- **November 25, 2010:** Thanksgiving Day Holiday (campus closed)

- **No schedule changes will be granted once finals week has started.** *There are NO exceptions to this policy.*