

# MATHEMATICS 2250-1 7:30am

## Ordinary Differential Equations and Linear Algebra

### Spring semester 2010

**Time:** MTWHF 7:30–8:20am JTB 140

**Instructor:** Professor Grant B. Gustafson<sup>1</sup>, JWB 113, 581-6879.

**Thursday Lecture:** The graduate assistants are Charles Cox and Ben Murphy.

**Office Hours:** JWB 113, MWF 8:40-9:15am and TH 2:50-3:40pm Appointments appreciated. Other times appear on my door card. From computers, read the door card link at the course web site. Ben and Charles also hold office hours for 2250 students.

**Telephone:** Gustafson: 801-581-6879 [113 JWB]. Murphy: 801-581-7311 [326 JWB]. Cox: 801-581-7653 [LCB Loft]. Please use email whenever possible.

**Email:** [ggustaf@math.utah.edu](mailto:ggustaf@math.utah.edu) , [murphy@math.utah.edu](mailto:murphy@math.utah.edu) , [cox@math.utah.edu](mailto:cox@math.utah.edu)

**Web site:** <http://www.math.utah.edu/~gustafso/>

**Exam Review and Exam Days:** The Thursday 2250 classroom is used for exams on three dates. Otherwise, the graduate student lecturers provide exam review, topic review, drill and tutorials on dailies, and maple lab details. Their main task is **exam review**, which follows a schedule published on the course web site. Please attend as advertised below, e.g., you may attend a different one each week, and close to an exam date, all three. On exam day, please attend on Thursday, usually as early as 6:50am, to give extra time to complete the exam. The exam dates for 2250-1, 7:30am, are 18 Feb, 18 Mar, 22 Apr, with final exam in the regular classroom on 5 May.

Exam Review and Exam Day Schedule				
Lecturer	Day	Review Time	Exam Day Time	Location
Gustafson	Thursday	7:30-8:20am	6:50-8:25am	JTB 140
Wang	Thursday	10:45-11:35am		LCB 219
Gustafson	Wednesday	12:55-1:45pm	12:50-2:55pm	WEB 104
Gustafson	Wednesday	2:00-2:50pm	12:50-2:55pm	WEB 104
Nguyen	TBA	TBA		TBA

**Tutoring:** The Math Department Tutoring Center, also called the *Math Center*, is located in the basement of building LCB. Free tutoring is offered Mon–Thu from 8 a.m. to 8 p.m., and from 8 a.m. to 6 p.m. on Friday. Some, but not all of the math tutors welcome questions from Math 2250 students. To see the times and specialities of various tutors, consult the web address

[www.math.utah.edu/ugrad/tutoring.html](http://www.math.utah.edu/ugrad/tutoring.html).

**Texts:**

*Differential Equations and Linear Algebra*, by C.H. Edwards Jr. and David E. Penney, 2009 Third Edition (the required text, ISBN-10: 0-13-605425-0). New problems and text material appear in the third edition.

The *2008 Special Edition* at the UofU bookstore, called the *Fatbook*, binds the second edition and the student solution manual into one volume. This action traps the *answers* to selected exercises a few hundred pages inside, instead of at the end of the book, as you might expect. While this book can be used, there have been many edits.

Additionally, we will use several sections from a different Edwards-Penney text, the current 2280 textbook, to cover *electrical circuits* and extra *Laplace transform* material. Students who buy the new text from the bookstore will receive an **access code to download the supplementary material**. Students who buy a second hand text may get copies of the sections needed by xeroxing the few pages necessary from the 2280 book, any edition [available in the Math Center for checkout].

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<sup>1</sup>Pronunciation: In the phrase *Gust of Wind* replace *Wind* by *Sun*.

*Student Solution Manual*, for the Edwards and Penney text *Differential Equations and Linear Algebra*. This is supplied with the bookstore's *special edition*. The third edition has a separately purchased solution manual.

*Differential Equations*, Cliff's Notes series. Contains concise examples and readable explanations of topics found in the Edwards-Penney text.

*Online sources for used textbooks*. Yes, they exist. Has anyone been ripped off by online sellers? Yes. Search the web for scary stories. One story documents a \$50 non-refundable shipping charge added on without notice and a 20% restocking fee [what's 20% of \$144?]. The total cost for the used book was \$25 more than a new book direct from Pearson Publishing.

*WWW documents for 2250* at web site <http://www.math.utah.edu/~gustafso/>. All are pdf or text documents that can be printed from Mozilla Firefox, MS-windows iexplorer, OS/X Safari, Opera and other web browsers that support printing of text and pdf files. Author: G.B. Gustafson. The notes and slides may be freely viewed and printed. The typeset material is a 900 page book on differential equations and linear algebra.

## Prerequisites

Math 1210 and 1220 or the equivalent (Calculus I and II). This is first-year Calculus, with a very brief introduction to linear differential equations. The old Math courses 111-112-113 of 1997-98 fulfill the requirement. In addition, background is required in planar curves, velocity and acceleration vectors from Physics 2210 or Math 2210 (Calculus III), or their equivalent courses. The co-requisite is Physics 2210 (Phy 301 before 1998), with actual use of physics minimal. There is use made in the course of partial derivatives, the Jacobian matrix and the chain rule in several variables.

To cooperate with the engineering programs on campus, some `maple` contact is required in the course work for 2250. All computer code examples are supplied in `maple` only.

If you want to use only `matlab`, then be aware that you must translate maple code examples to matlab code by yourself. Generally, this is a nontrivial exercise. Some help is available in maple itself, for automatic generation of matlab code from maple code. See `CodeGeneration[Maple]` in maple help.

A passive knowledge of `maple` is assumed. Persons without the passive knowledge of `maple` and `unix` may attend one of the *tutorials* on the subject offered during the first two weeks of the term. The instructor for these tutorials is selected by Angie Gardiner. The dates and times are published at the 2250 course site web address listed above.

Angie's web page is [www.math.utah.edu/ugrad/tutoring.html](http://www.math.utah.edu/ugrad/tutoring.html). Her office is MC 155A in building LCB, next to the Math center, phone 801-585-9478, email [gardiner@math.utah.edu](mailto:gardiner@math.utah.edu) .

Persons without computer training and no maple experience can survive through Chapter 2 with a graphing calculator and Microsoft's `Excel` or the MathWork's `matlab`. Free software exists for PC Intel hardware to duplicate most of matlab's functionality. Individual copies of matlab after 2008 may no longer have maple engines, but some other computer algebra system, instead.

Free tutoring is available in the LCB tutoring center 8:00 a.m. to 8:00 p.m. daily, except until 6:00pm on Friday, closed weekends and semester holidays. Some maple help is available. Only a few of the tutors are capable of helping you on computer projects or on 2250 homework problems. The work hours of those individuals can be found by calling the math center help desk.

## Course material and requirements

This course is an introduction to linear algebra and differential equations in engineering and science. Chapters 1 to 10 in the Edwards-Penney text, supplementary materials from the Edward-

Penney *Differential Equations and Boundary Value Problems* textbook (4/E edition), and class notes published as PDF [www](#) documents will make up the course material.

If you study in isolation, then please know that some topics are enriched in class. Your grade in the course may be reduced by isolation, because the enriched material is tested on exams. Past exams and solution keys appear at the course web site. You are expected to study past exams in detail.

### **Grading:**

Final grades will be based on:

Textbook problems, the major part of the **dailies**, about 125 scores.

Seven computer projects form the minor part of the **dailies**. Each project is counted like several textbook problems, for a total of 27 scores, making  $125+27=152$  dailies.

Three written midterm examinations. They are given during the TA sessions. This course meets 5 days a week (2250-1) or 3 days a week (2250-4).

Final exam. This University-scheduled in-class 2-hour examination counts as two additional midterm scores.

### **Written In-Class Exams:**

There are three (3) midterm exams. There is a 2-hour in-class final exam as scheduled by the university. The midterm and final exams are graded by G.B. Gustafson and the Thursday graduate assistant lecturers. These exams are scheduled for Thursday Lab time 7:00am and 12:55pm in the Wednesday classroom. There are no additional exam times. Please notify me **in advance of the exam date**, that you will miss the exam. If that is not possible, then notify me anyway. Email is best, [ggustaf@math.utah.edu](mailto:ggustaf@math.utah.edu) . Phone 801-581-6879 (my office) or 801-581-6851 (math office) works too. Please know that once you miss the exam, the crisis has ended, and recovery is the next plan. Please respond ASAP.

### **Hand-written Dailies:**

There will be 152 dailies due during the semester, including textbook problems and seven maple labs. They will be graded by a staff of readers employed by Angie Gardiner.

### **Records:**

Accounting of exams and the dailies is initially on paper. By the end of the semester there are usually 200 sheets of double-sided paper records.

Ultimately the paper records are turned into spreadsheet records. The electronic records are web-posted, without names. Lookup of your electronic record requires that you know your exam scores and a few daily scores. During the course, the first electronic record is printed and distributed in class like returned homework. This usually happens after exam 3. In any case, web-posted electronic records are available after the final exam and for months after the course ends.

If you ask for record information before it is electronic, and web-posted, then the request involves 20-30 minutes of your time, to retrieve it from paper records. This is in general a waste of time, and I will refuse the service, if it is only to find a few missing dailies. Please keep your own records. Correction of records, when required, can be made by email communication, even after the course ends.

## **Homework, computer labs, midterms and final**

### **Submission and Return of Dailies**

Textbook problems, maple labs and extra credit problems (called *dailies*) will be submitted in class. The return of the large volume of written work is problematic, because no one has the time in class to search through a giant stack of paper.

Work is accepted as a stapled package with your name on the top sheet in the upper right corner, the time of your class just below your name, followed by the **group stack**, which is a sublist of the students, obtained by dividing the alphabet into 4 subsets, like A-D, E-J, K-R, S-Z. The actual division depends on the class size and distribution of names.

Work is returned in class in stacks, one stack for each group. One attempt will be made to return a stack. Then the stack goes in a box outside 113 JWB, and you will have to retrieve your work with a separate trip.

## Textbook problems

The problems to be submitted for grading are listed at the end of the syllabus and also on the **grade sheet** for the course. A duplicate of this information appears on the **due dates page** at the course web site. Visit the web site for extra copies of the syllabus and grade sheet.

The due dates for problems appear only on due dates page at the course web site. They are dynamically updated to reflect the reality of what was discussed in class. Ideally, problems are submitted shortly after class discussion.

Students are asked to complete each textbook problem and submit their work in their own handwriting. Collaboration is permitted and encouraged on textbook problems in teams of 2 and study groups of a larger size. Submit a separate handwritten report for each partner.

Homework problems are written as several problems per package with your name, class time on each sheet, and a problem label for each problem. **Please write 7:30 or 10:45 on your paper, next to your name, and insert a problem label.** Problem labels look like `1.2-5`, for problem 5 in section 1.2 of Edwards-Penney. Page numbers: please do not cite or label a problem by page number only. Citation for the supplementary material can look like `EPbvp 7.6-4`. For extra credit problems, use a label like `Xc1.4-5`.

Graders try to write the scores on the top page. This plan speeds up return of the work, so please use stapled packaging when it makes sense. No stapler? Just deposit your work in a stack without the staple.

There are certain **rules** for writing up the textbook problems. A full accounting of the *format suggestions* contributed by students of 2250 appears on the internet course page as a pdf document *format for submitted work*. Please apply the ideas found there to your written work.

## Computer projects

There will be seven computer projects assigned during the semester, related to the classroom material. Each project counts the same as 3 to 4 daily problems from the textbook, for a total of 27 scores on the dailies. They will be written by hand and use the software package **maple**.

Maple labs are submitted in a stapled package containing all requested parts.

There is a Math Department Computer Lab in building LCB at which registered students automatically own accounts, and there are other unix labs around campus where **maple** is also available, for example at the College of Engineering CADE lab. Most unix labs can launch remote tty sessions on math hosts using command `ssh user@xserver.math.utah.edu`. To operate in X-windows, replace `ssh` by `ssh -X` or `ssh -X -Y`. Remote files on math hosts can be transferred to your local unix computer with `sftp`. For information on how to do the same for personal computers, visit the campus computer help sites.

There is *free* tutoring support for these projects (graduate assistant lecturers) and for your other course work as well. Drop-in tutoring in the *Math Center* (glass doors to the computer lab) in the basement of building LCB starts the second week of the semester. The staff there is best at elementary topics from algebra and calculus. A few of them can handle 2250 questions.

## Midterm exam details

The exams are modeled after old exams. Available on the web page are old exams and solution keys, including all midterm and final exams for the last three years. You may print these for reference. The final exam has a separate study guide, also available at the site.

Books, tables, notes, cell phones, ipods, earphones and calculators are not allowed on exam day.

An in-class Midterm exam has different presentation rules, and none of the textbook problem rules apply in this case. Basically, the in-class exam is a first draft. No answer checks are expected. Answers count 25% and details count 75%.

## Final exam details

Two hours are reserved for this written exam. As published by the university:

**7:30 class** Wed, May 5, 2010 from 7:30am to 10am [JTB 140]

**12:55 class** Mon May 3, 2010, 12:30pm to 3:00pm [JWB 335]

The final exam is comprehensive. It covers explicitly chapters 3, 4, 5, 6, 7, 8, 9 and 10 with weight distributed evenly across the chapters listed. A study guide consisting of problem types by chapter plus several final exam solution keys for previous final exams appear at the web site. There is implicit contact on the final exam with chapter 1 and 2 topics, but there are no matching problems [see last semester's final exam key].

No notes, calculators, tables, books or aids of any kind are allowed on the final exam. Please bring pencils and eraser. Paper will be supplied.

## Due dates, extra credit and late work

### Due dates

Due dates are updated dynamically at a link on page

<http://www.math.utah.edu/~gustafso/index2250.html>.

Browse this site often. To repeat: **the due dates are not given in class!** Email communication will be made for due date changes and upcoming exams. The registrar's list is used for communication.

Please prepare submitted work according to the tentative schedule of due dates. The actual due date is the same date, or one day later, as documented on the web site.

### Email notification

You will be sent email about due dates, exam reviews and exam dates during the semester. This service depends on your email address being up to date.

Look up your campus information data by visiting the registrar's campus WWW site (where you add classes). Find out your email address, then test it by emailing a message to yourself. To update the information, return to the registrar's site and edit your personal data.

### When is work late?

Due to the number of dailies being collected, work is considered late and therefore unacceptable when the stack of papers exits 113JWB and goes to the grader. Papers not in the stack get a zero recorded for the assignment.

Are you an exception? It is better to ask than to assume anything. Depend on extra credit problems (see below) to make up for work not submitted on schedule. The same advice applies,

if submitted work earns a grade of 55 or 0. While a zero generally means no work was submitted, graders sometimes reject a paper completely and mark it zero, as though nothing was submitted. You'll get the paper back and maybe an explanation of why they did that.

The state of submitted work is locked at the point the grader gets the stack. A grader's job is to filter out the good work from the bad work and record the result. This record is never appended, it is only corrected for errors.

The lowest six (6) dailies are dropped from consideration in order to eliminate makeups. There is no distinction between a problem from the textbook and a maple lab problem, they earn the same credit.

If more than ten (10) textbook problems have zero scores, then please call 581-6879 or email [ggustaf@math.utah.edu](mailto:ggustaf@math.utah.edu) and discuss the situation and options for completing the work.

## Extra credit

Extra credit problems are only available in PDF format at the course web site. They do not appear in the textbook, in this syllabus or on the grade sheet. Instructions for extra credit problems appear at the end of this document, just before the lecture and homework list. Briefly, the deadline for extra credit in a chapter is the due date printed on the extra credit page, or as updated on the due dates page at the web site.

## Withdrawal

It is the Math Department policy, and mine as well, to grant any withdrawal request until the University deadline. This promise also means that such a withdrawal requires no explanation. Withdrawals are always initiated by the registered student. All paperwork is the duty of the student. My job is the signature.

## ADA statement

The American with Disabilities Act requires that reasonable accommodations be provided for students with physical, sensory, cognitive, systemic, learning, and psychiatric disabilities. Please contact me at the beginning of the semester to discuss accommodation (113 JWB or 801-581-6879), which is to say, accommodation shall be made.

section\*Grading details

**Grading Scale:** The letter-to-percentage scale is uses GPA increments, which step 1/3 from 0.0 = *E* to 4.0 = *A*. Briefly, *A* = 95, *B* = 82, *C* = 67, *D* = 52. In detail:

$$\begin{aligned} A &= 95-100, A^- = 90-94, B^+ = 85-89, B = 80-84, \\ B^- &= 75-79, C^+ = 70-74, C = 65-69, C^- = 60-64, \\ D^+ &= 55-59, D = 50-54, D^- = 45-49, E = 0-44. \end{aligned}$$

The scale is used for grading exams and for final letter grade reporting. This scale is for internal use only. See below for examples.

## Final grade

A grade of *E* is assigned if the Dailies score sums to less than 6000, which is 60 dailies, or 40% of the required dailies. Please read the **Rite of passage** paragraph below.

The letter grade is determined from the *Grading Scale* above as follows:

$$\text{Final Grade} = \frac{30}{100}(\text{Dailies Average}) + \frac{70}{100}(\text{Midterm+Final Average}).$$

An example: the Dailies Average for 152 textbook problems and maple labs is 91% and the Exam Average of the three midterms and the final exam is 87%. The final grade is  $0.3(91) + 0.7(87.5) = 87.55\%$ , which by the scale above is a *B+*. While 87.55 rounds to 88, a *B+*. It is close to an *A-*,

the deciding factor is the exam average of 87.5, which is squarely a  $B+$ . The final grade is  $B+$ . If the dailies average was 96 or higher, then the final grade would be 90.05 or higher, which is an  $A-$ .

A precise description of the method of assigning letter grades follows. First, compute the course average  $A = 0.3A_1 + 0.7A_2$  from the dailies average  $A_1$  and the exam average  $A_2$ . Truncate  $A$  to an integer (e.g.,  $A = 94.96$  truncates to 94). Assign a letter grade  $L$  according to the grading scale (see above). Look at the final exam score  $F$  and the exam average  $A_2$ . If  $F$  would give a higher letter grade, then change  $L$  to the next possible higher letter grade, e.g., change a  $B+$  to an  $A-$  (but not  $B+$  to  $A$ ). In some cases, when  $F$  is low or  $A_1$  is low, the average  $A_2$  will be used to decide on the letter grade. An example:  $A = 94.96$ ,  $F = 92$ ,  $A_1 = 94.86$ ,  $A_2 = 95$ . The letter grade is  $A-$ , but the exam average is 95 or  $A$ , therefore the letter grade  $A-$  should be promoted to an  $A$ .

It is possible with a very low daily average to have rank one or two in the class and yet earn a final grade of **B**. This happens because the influence of the dailies score is just 30%. An example: final exam grade 100, exam average 99, dailies 50. Then

$$0.3 * 50 + 0.7 * 99 = 84.3 = \mathbf{B}.$$

## Rite of passage

A passing grade in the course requires submission of at least 60 of the 152 dailies (dailies include computer projects). A grade of  $E$  is assigned if less than 60 Dailies are submitted. The scores on the 60 dailies are expected to be 100%. This requirement is met by submitting dailies for chapters 1 through 4, each with a grade of 100.

The right of passage is absolute, similar to the European system, which requires a body of work to be presented before written and oral final exams are taken. For example, the Czech *vypočet* is a requirement to show a body of completed work as the entrance requirement to administration of written and oral final exams.

## Engineering School Expectations

Mechanical, electrical and chemical engineering departments expect stellar performance in differential equations and linear algebra. They have asked for homework to be collected and graded. All of it, not some minimal portion of the total homework.

The various engineering and science departments served by 2250 decide the list of topics to be taught, not the math department.

Graduation requirements of a **C-** or better in required math courses seem to be counter to departmental requests. Be advised that a grade of **C-** is viewed these days as a failure by all graduate schools and employers.

## How dailies are graded

Graders assign scores on dailies as one of 100, 55 or 0. Based on grading history, about 90% of the scores on a given problem are 100%. A score of 0 is routinely given for work not submitted.

**A grade of 100** usually means a complete, correct solution was written. Graders are asked to be generous, and give a 100 score when the solution method is correct, even if the details contain arithmetic errors and a few missing steps. Flaws in logic are not excused, even if the correct answer was found, due to multiple errors canceling the logic error.

**A grade of 55** means the written work lacked essential details. This score is often given for a written solution with just the answer and a few sketchy details. Examples of sketchy solutions, worth 55 or 0 for a score, appear in the textbook's solution manual. The naive assumption that the textbook's authors have supplied a solution to the problem in the manual is simply false: it is a solution sketch, by design devoid of essential details.

The wrong answer is a reason for the grader to look for a flaw. Because all written solutions must have an answer check, a wrong answer signals a careless report. The graders have license to be kind, or to be unkind.

## Extra credit problems

Extra credit problems are only available in PDF format at the course web site. They do not appear in the textbook, in this syllabus or on the grade sheet. It is possible, because of them, to earn 100% credit on each chapter and 100% on each maple lab.

Grades on extra credit problems and extra credit maple lab sections are 100 and 0. Generally expect an extra credit problem to be more difficult than the standard assignment.

**Which problems should I work?** You can choose whichever extra credit problems that you want, to replace scores of 55 or 0, within a given chapter. Just because you missed 1.2-2 is no reason to work Xc1.2-2. Instead, choose a problem from the extra credit problems for chapter 1 that can extend your knowledge or help you to prepare for exams. My advice is to beat on problems you missed, because missing a problem is usually a wake-up call. If it was just a silly mistake, like miscopying the problem statement, then choose a different problem.

To illustrate **how credit is applied**, suppose that chapter one has 15 dailies and 5 extra credit problems. Consider this record:

Problem Count	Score	
9	100	successful dailies
3	55	dailies with demerits
3	0	failed dailies
4	100	extra credit, success

Then the average on chapter one is the smaller of  $(9 * 100 + 3 * 55 + 4 * 100)/15 = 97.67$  and 100. The fifth extra credit problem could add 100 to the total, then the average is 100%.

Extra credit is **applied to each chapter individually**. For example, an extra credit problem like XC1.2-12 applies only to chapter 1. An exception to this rule is end-of-semester extra credit problems, which apply to increase the dailies average up to a maximum of 100%. Generally, this offer applies only to a few dailies which were skipped by decree (snow days can cause this), and to chapter 9 [dynamical systems] and chapter 10X [challenging Laplace] extra credit problems, which add credit across all chapters. Chapter 9 accordingly has no targeted extra credit problems [it's at the end of the course, we're out of time].

## Purpose of the textbook problems

The *purpose* of the problems is to practice doing mathematics, that is, to write out in detail the solutions to problems. A textbook problem is generally an engineering-style “crank” problem, usually devoid of proofs. The process:

- **Understand the problem.** Understanding usually involves reading the *problem notes* and the textbook. Answers are usually not provided. You may get an outline of the solution, to increase the probability that the project gets completed on schedule. Problems are discussed in class in finer detail, often with the aid of computer slides, which are mirrored at the web site as PDF files. Slides cover a similar problem or sometimes the exact problem considered in the project.
- **Background reading.** To solve a problem, a second opinion of the theory and method is essential. It might be that you can flesh it out of your book's examples, the college algebra text, the calculus text or some engineering mathematics book. No matter, go to a source that works for you. This is *reading* and not a tutorial.



- **Scratch Paper Write-up.** The initial creation of a solution is the essence of the learning process. Everyone learns by repetition, and here is where you do it. Use a pencil and a big eraser, lots of paper, and flesh out a first draft at full speed. Don't submit this draft!
- **Final Copy.** The final copy of the solution uses the scratch paper draft as raw material to *present* the details of the solution. As such, it is more than a collection of formulas on paper. There is no strict requirement, except that *neatness* and *completeness* are a must.
- **Final Copy Format.** The most successful format to date was invented by several engineering mathematics students over the years 1990–2010. This format is described in some detail below and also in the internet document *format for submitted work*.

### Suggestions for Improving Written Work

1. Use engineering paper or plain white paper. Lined notebook paper and graph paper are not acceptable for mathematics, because they introduce flaws in vertical white space.
2. Reports are hand-written in pencil. They start with a problem statement followed by the book's answer or by a final answer summary. Supporting material appears at the end, like a tax return.
3. Every report has an answer check. For problems with textbook answers, it is usual to see "*the answer matches the textbook,*" or briefly **B.O.B.** For problems without a textbook answer, a full answer check is expected.
4. Mathematical notation is on the left, text on the right, about a 60% to 40% ratio. One equal sign per line. Justify equations left or align on the equal signs.
5. Text is left-justified on the right side. It includes explanations, references by keyword or page number, statements and definitions, references to delayed details, like long calculations, graphics and answer checks.
6. Rules 4 and 5 can be broken. They are suggestions, not rules.

**Cooperative efforts** are allowed and encouraged. Kindly produce individual handwritten reports. There is no penalty for getting help from others – it is encouraged. This includes tutorial staff in the Math Center LCB, teaching assistants and fellow students.

**English language deficiencies** are tolerated but not excused. Graders prefer short, precise English comments. If English is your second language, then try to improve your writing skills: (1) shorten comments and (2) use page references to the textbook.

**Presentation** is expected to improve throughout the 15 weeks of the course. You are not expected to be an expert in the first week. Correctness of answers will be checked. The problem notes might contain answers plus a solution outline. In class, further details are communicated. Your job is to *improve* on the initial start into the solution. Add the particulars, make comments, and chase down the details from algebra and calculus. College algebra and calculus skills need constant and careful review. Writing up the solution identifies the stumbling blocks and forces a review of background material.

**References** are required on the first occurrence. After that, omit the citation. It is appropriate to refer to the previous assignment on which the citations originated. A statement like *References parallel Exercises 1-5* is enough.

### Extra credit instructions

Extra credit problems add credit to the chapter in which they appear. They do not add credit to any other chapter. The exceptions are Chapter 9 and Chapter 10X extra credit, which add credit to any and all chapters. The maximum credit that can be earned in a chapter is 100%. An example:

Standard problems and maple labs might total 1600 for a chapter, which counts as 16 items on the grade sheet. Extra credit problems could potentially add 5 times 100 or 500. If 1355 was earned on standard problems and maple labs, plus 300 on extra credit, then the total earned is  $(1355 + 300)/16 = 103.44$ . This total is truncated to 100, because you may earn no more than 100% for a chapter.

**Location.** The web site <http://www.math.utah.edu/~gustafso/index2250.html> has a link to PDF files for all extra credit problems, one PDF file for each chapter. They do not appear in the textbook, the syllabus, nor the grade sheet.

**Submissions.** Please submit extra credit problems with a special label. To illustrate, extra credit problem **1.2-12** would be submitted with label **XC1.2-12** next to your name and class time.

**Deadline.** The deadline for submitting extra credit is approximately the due date for the last problem of the next chapter. The extra credit stack is delivered on that date to a grader. The records are locked by the grader and never appended, only corrected.

The exact date for submission of extra credit work is set at the web site due date page. This is done to give extra time, when available, due to busy grader schedules. Please check the due dates page often, especially before preparing work to be submitted.

**Which problems should I work?** You can choose whichever extra credit problems that you want, to replace scores of 55 or 0, within a given chapter.

**How do I get credit for a missed maple lab?** You can get credits for maple labs by doing a maple extra credit lab, or math-only extra credit problems. Check that the maple lab appears in the extra credit problem file, then choose *any problem* from that chapter of extra credit exercises.

## Policies on Dailies and Exams

**Policy on Dailies:** The highest 146 dailies will be counted. The lowest 6 of the 152 dailies will be dropped. Any record with less than 60 dailies earns a grade of **E**, regardless of midterm and final exam scores. Deadlines set at web site [www.math.utah.edu/~gustafso/](http://www.math.utah.edu/~gustafso/). Work not in the stack sent to the assistant earns a grade of zero. Extra credit exercises can correct these zeros.

**Policy on Exams:** The final exam is doubled before determining the exam average, to count like two midterms. The effect can be imagined as five midterm scores, averaged to obtain the semester exam score average.

**Policy on Rank-in-Class:** The class ranking is determined only by the exams. Rank 1 is the best, determined by sorting on the exam average  $(\text{mid1} + \text{mid2} + \text{mid3} + \text{final} + \text{final})/5$ . There is no influence on class standing from dailies.

**Dailies and Letter Grade:** The dailies affect only the final letter grade assigned. A grade of *E* is assigned for less than 60 dailies. Otherwise, dailies contribute 30% towards the letter grade. In extreme cases, the influence is  $\pm$  one letter grade, e.g., *B-* on exams changes from *C-* to *A-*.

**Grading Scale:** The internally-used scale is uses GPA increments, which step  $1/3$  from  $0.0 = E$  to  $4.0 = A$ . Briefly,  $A = 95$ ,  $B = 82$ ,  $C = 67$ ,  $D = 52$ . In detail:

A	=	95-100	,	A-	=	90-94	,	B+	=	85-89	,	B	=	80-84	,
B-	=	75-79	,	C+	=	70-74	,	C	=	65-69	,	C-	=	60-64	,
D+	=	55-59	,	D	=	50-54	,	D-	=	45-49	,	E	=	0-44	.

## Tentative Due Dates and Lectures 2250-1 7:30am Spring 2010

### Week 1, Jan 11 to 15

Lecture 1.1, 1.2, 1.3, 1.4.

11 Jan, Intro, GB Gustafson, nothing due.  
12 Jan, Nothing due.  
13 Jan, Submit Page 16, 1.2-2 for quick review.  
14 Jan, Intro, Thu. assistants Ben Murphy and Charles Cox  
15 Jan, Begin maple lab 1.

### Week 2, Jan 19 to 22

Lecture 1.5, 2.1, 2.2.

18 Jan, No class, Martin Luther King  
19 Jan, Nothing due.  
20 Jan, Nothing due.  
20 Jan, LCB115: Time TBA, First maple intro.  
21 Jan, Cox and Murphy: Quadratics and maple lab 1. Exam 1 review. Drill, Q&A ch1.  
22 Jan, Page 16, 1.2: 2, 4, 6, 10  
22 Jan, Page 26, 1.3: 8, 14  
22 Jan, LCB115: Time TBA, Repeat maple intro.

### Week 3, Jan 25 to 29

Lecture 2.3, 2.4, 2.5, 2.6.

25 Jan, Nothing due.  
26 Jan, LCB115: Time TBA. Repeat maple intro.  
17 Jan, Nothing due.  
28 Jan, Cox and Murphy: Discuss maple L2.1. Exam 1 review. Drill, Q&A ch1.  
29 Jan, Page 41, 1.4: 6, 12, 18, 22, 26  
29 Jan, Page 54, 1.5: 8, 18, 20, 34

### Week 4, Feb 1 to 5

Lecture 3.1, 3.2, 3.3.

01 Feb, Nothing due.  
02 Feb, Nothing due.  
03 Feb, Nothing due.  
04 Feb, Ben and Charles: Exam 1 review. Discuss maple L2.  
05 Feb, Page 86, 2.1: 8, 16  
05 Feb, Page 96, 2.2: 10, 14  
05 Feb, Page 106, 2.3: 10, 20

### Week 5, Feb 8 to 12

Lecture 3.4, 3.5, 3.6.

08 Feb, Submit Exam Review problems ER-1, ER-2

09 Feb, Submit Maple lab 1: L1.1, L1.2, L1.3, L1.4

10 Feb, Submit maple L2.1 copy for quick review.

11 Feb, Ben and Charles: Exam 1 review.

Discuss maple Lab 2.

12 Feb, Page 152, 3.1: 6, 16, 26

12 Feb, Page 162, 3.2: 10, 14, 24

12 Feb, Page 170, 3.3: 10, 20

### Week 6, Feb 15 to 19

Lecture 4.1, 4.2, 4.3, 4.4.

15 Feb, No class, President's Day

16 Feb, Nothing due.

17 Feb, Nothing due

18 Feb, Midterm 1, Five problems ch1 and ch2

19 Feb, Page 182, 3.4: 20, 30, 34, 40

19 Feb, Page 194, 3.5: 16, 26, 44

### Week 7, Feb 22 to 26

Lecture 4.4, 4.5, 4.6, 4.7.

22 Feb, Nothing due.

23 Feb, Nothing due.

24 Feb, Page 212, 3.6: 6, 20, 32, 40, 60

25 Feb, Ben and Charles: Exam 2 Review. Drill, Q&A Ch3.

25 Feb, Ben and Charles: Discuss maple L3.

26 Feb, Page 233, 4.1: 16, 20, 32

26 Feb, Page 240, 4.2: 4, 18, 28

### Week 8, Mar 2 to 6

Lecture 5.1, 5.2, 5.3, 5.4.

02 Mar, Nothing due.

03 Mar, Nothing due.

04 Mar, Submit maple lab 2: L2.1, L2.2, L2.3, L2.4

05 Mar, Ben and Charles: Exam 2 review.

05 Mar, Ben and Charles: Discuss maple L4.

06 Mar, Page 248, 4.3: 18, 24

06 Mar, Page 255, 4.4: 6, 24

### Week 9, Mar 8 to 12

Lecture 10.1, 10.2, 10.3, 10.4

08 Mar, Nothing due.

09 Mar, Nothing due.

10 Mar, Page 263, 4.5: 6, 24, 28

10 Mar, Page 271, 4.6: 2

10 Mar, Page 278, 4.7: 10, 20, 26

11 Mar, Ben and Charles: Exam 2 review.

Discuss maple L4.

12 Mar, Page 294, 5.1: 34, 36, 38, 40, 42, 46, 48

10 Mar, Page 306, 5.2: 18, 22

10 Mar, Page 319, 5.3: 8, 10, 16, 32

### **Week 10, Mar 15 to 19**

Lecture 10.5, EPbvp7.6, 5.5

15 Mar, Nothing due.

16 Mar, Page 331, 5.4: 20, 34

17 Mar, Nothing due.

18 Mar, Midterm 2, Five problems ch3, ch4, ch5.1-5.3

19 Mar, Nothing due.

### **Spring Break: Mar 20-27**

Happy Holiday!

20-27 Mar, Traveling? Nothing due from Mar 17-29. Substantial amounts of dailies, including maple projects, are due after the break.

### **Week 11, Mar 29,30,31 and Apr 1,2**

Lecture 5.6, EPbvp3.7, 6.1, 6.2

29 Mar, Nothing due.

30 Mar, Submit maple lab3: L3.1, L3.2, L3.3

30 Mar, Submit maple L4 :

L4.1, L4.2, L4.3

31 Mar, Nothing due.

01 Apr, Ben and Charles: Exam 3 review.

Discuss maple lab5.

02 Apr, Page 576, 10.1: 18, 28

02 Apr, Page 588, 10.2: 10, 16, 24

02 Apr, Page 597, 10.3: 6, 18

02 Apr, Page 606, 10.4: 22

### **Week 12, Apr 5 to 9**

Lecture 7.1, 7.2, 7.3, 7.4.

06 Apr, Page 616, 10.5: 4, 22, 28

06 Apr, Page 510 in EPbvp 7.6: 8, 22

07 Apr, Nothing due.

08 Apr, Page 346, 5.5: 54, 58, 6, 12, 22

08 Apr, Ben and Charles: Exam 3 review.

Discuss maple lab6

09 Apr, Page 357, 5.6: 4, 8, 18

09 Apr, Page 227 in EPbvp 3.7: 4, 12

### **Week 13, Apr 12 to 16**

Lecture 7.4, 7.5 /w Laplace, 8.1, 8.2.

12 Apr, Nothing due.

13 Apr, Submit maple lab5: L5.1, L5.2, L5.3

14 Apr, Submit maple lab6: L6.1, L6.2, L6.3

15 Apr, Ben and Charles: Exam 3 review.

16 Apr, Page 370, 6.1: 12, 20, 32, 36

16 Apr, Page 379, 6.2: 6, 18, 28

### **Week 14, Apr 19 to 23**

Lecture 9.1, 9.2, 9.3.

19 Apr, Submit maple lab7: L7.1, L7.2, L7.3, 7.4

20 Apr, Nothing due.

22 Apr, Nothing due.

22 Apr, Midterm 3, Five problems ch5, ch10, ch6

23 Apr, Page 400, 7.1: 8, 20

23 Apr, Page 413, 7.2: 12, 14

23 Apr, Page 425, 7.3: 8, 20, 30

23 Apr, Page 438, 7.4: 6, 24

### **Week 15, Apr 26,27,28**

Lecture 9.4, Final Review.

26 Apr, Nothing due.

27 Apr, 8.1: 4, 12, 38

27 Apr, 8.2: 4, 19

28 Apr, 9.1: 4, 8, 18

28 Apr, 9.2: 2, 12, 22

28 Apr, 9.3: 8, 9, 10

28 Apr, Office hours and lectures finished.

30 Apr, Semester Extra Credit 9.4: 4, 8

30 Apr, Semester Extra credit Ch9, Ch10X and maple 8,9,10 due.

Deliver under the door 113jwb by 6pm.

01 May, Saturday: Special Final Exam review, 2pm, LCB 219

May 3 and 5, Final Exam.

See the online final exam study guide.

### **Exam Period, May 3 and 5**

Final exam for the 7:30am class is Wed, May 5, 2010 from 7:30am to 10am [JTB 140] .

Final exam for the 12:55pm class is Mon May 3, 2010, 12:30pm to 3:00pm [JWB 335].

**Extra Credit:** Under the door, 113jwb.

30 Apr, Ch9 Extra Credit. About 10 problems appear on the ch9 extra credit page.

30 Apr, Ch10X Extra Credit. About 10 challenging Laplace problems appear on the ch10X extra credit page.

30 Apr, Maple Optional Lab 8:

Earthquake L8.1, L8.2, L8.3, L8.4, L8.5

30 Apr, Maple Optional Lab 9:

Tacoma Narrows L9.1, L9.2

30 Apr, Maple Optional Lab 10:

Brine and Glucose L10.1, L10.2, L10.3, L10.4

Extra credit records locked at 6pm on 30 Apr.

Ch9, Ch10X and maple 8,9,10 credits apply to the semester dailies total, not just ch9.