

**MATHEMATICS 2250-1 7:30am**  
**Ordinary Differential Equations and Linear Algebra**  
**Spring semester 2012**

**Time:** MTWHF 7:30–8:20am JTB 140

**Instructor:** Professor Grant B. Gustafson<sup>1</sup>, JWB 113, 801-581-6879.

**Thursday Lecture:** The graduate assistant for 7:30am is Patrick Bardsley, LCB Loft, 801-581-7653, [bardsley@math.utah.edu](mailto:bardsley@math.utah.edu). Patrick meets the 2250 lab in JTB 140 from 7:30am to 9:25am. Midterm exams are given by Patrick in six (6) of these sessions. If you need extra time on exams, then plan to attend at 7:30 and continue until finished or the end at 9:25am.

**Office Hours:** JWB 113, MTWF 8:40-9:15am and 3:10-4:00pm. Appointments are always appreciated. Other times appear on my door card. From computers, read the door card link at the course web site. Patrick Bardsley also holds office hours for 2250 students.

**Telephone:** Gustafson: 801-581-6879 [113 JWB]. Please use email whenever possible.

**Email:** [ggustaf@math.utah.edu](mailto:ggustaf@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 six dates. Otherwise, the graduate student lecturer provides 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 7:25am, to give extra time to complete the exam. Exam dates are published on the grade-sheet and also the web site due dates page. Email is sent before each exam, as a reminder.

**Exam Review and Exam Day Schedule**

| Lecturer           | Day      | Review Time | Location |
|--------------------|----------|-------------|----------|
| Gustafson/Bardsley | Thursday | 7:30am      | JTB 140  |
| Gustafson/Bardsley | Thursday | 8:35am      | JTB 140  |
| Korevaar/Gaffney   | Thursday | 10:45am     | LCB 219  |
| Korevaar/Gaffney   | Thursday | 11:50am     | LCB 219  |
| Childs/Miller      | Monday   | 12:55pm     | JWB 335  |
| Childs/Miller      | Monday   | 2:00pm      | JWB 335  |

**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

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

**supplementary material.** Students who buy a used 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 and Math Library for checkout].

*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.* A web search discovered a story which 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.

*Illegal copies.* It is illegal to xerox a whole textbook. It is also illegal to download a PDF copy of a whole textbook.

*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 from 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 50-minute *tutorials* on the subject offered during the second and third 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 Edwards-Penney *Differential Equations and Boundary Value Problems* textbook (2280 book, any edition, sections 3.7 and 7.6) 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**, 128 scores. This includes two special exam review problems ER-1, ER-2, which are not in the textbook, but at the course web site.

Seven computer projects form the minor part of the **dailies**. Each project is counted like several textbook problems, for a total of 24 scores, making  $128+24=152$  dailies.

Three written midterm examinations. They are given during the TA sessions. Each midterm is five (5) problems. The first (3) three problems are given on one date and the last two (2) problems the next date. This course (2250-1) meets 5 days a week.

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 lecturer. These exams are scheduled for Thursday Lab time 7:25am or 8:30am. 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 100 sheets of double-sided paper records.

Ultimately the paper records are turned into spreadsheet records. The spreadsheet records are web-posted at the Registrar's web site, the site where you register for classes and pay tuition. After login, connect to the link for **webCT**. Your grades will be posted and periodically updated, even beyond the end of the semester.

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.