Text   We will be using *A First Course in Linear Algebra*, (Version 2.30) by Robert A. Beezer as our textbook. A physical copy of version 2.00 may be purchased from `Lulu.com` and is not substantially different. Electronic copies of the textbook can be found at the book's website (`linear.pugetsound.edu`). These may be updated weekly, usually on Wednesday evenings, but Version 2.30 will be the canonical text for the entire semester.

The Bookstore also has a *highly* recommended optional text: *The Nuts and Bolts of Proofs* by Antonella Cupillari (Third Edition). The course WWW page has some recommendations for similar books about proof techniques.

Home Page   Start at `http://buzzard.ups.edu/courses.html` for the course web page.

Office Hours   My office is in Thompson 303; the telephone number is 879–3564. Making appointments or simple, non-mathematical questions can be handled via electronic mail — my address is `beezer@ups.edu`. Office Hours are 10:00-10:50 on Monday and Friday, and 9:30-11:20 on Tuesday and Thursday. You may make an appointment for other times, or just drop by my office. Office hours are your opportunity to receive extra help or clarification on material from class, or to discuss any other aspect of the course.

Computation   Linear algebra is at the heart of many large computations in physics, chemistry, economics, statistics and other disciplines. So it is useful to become familiar with relevant software. Futhermore, freed from doing error-prone numerical computations you can concentrate on new ideas and concepts.

For both reasons, we will make extensive use of Sage. Since Sage is open source software, it is available freely in many places. Your default installation is the on-campus server at `sage.pugetsound.edu` which will be running the latest version and will remain constant all semester. Availability, version incompatibility or convenience of other sites is not an excuse for not being able to use Sage. There are thorough discussions about Sage, available at the website for your textbook. We will discuss in class the use of Sage during examinations.

Homework   There is a nearly complete collection of exercises in the text. Any (or all) of the problems will be good practice as you learn this material. Many of these problems have complete solutions in the text to further aid your understanding. Of course, you are not limited to working *just* these problems. I expect to be formulating additional exercises for Sage as we go along through the semester.

None of these problems will be collected, but instead they will form the basis for our near-weekly "Problem" sessions and for discussions in office hours. It is your responsibility to be certain that you are learning from these exercises. The best ways to do this are to work the problems diligently as we work through the sections (see attached schedule) and to participate in the classroom discussions. If you are unsure about a problem, then a visit to my office is in order. Making a consistent effort outside of the classroom is the easiest way to do well in this course.

> Mathematics not only demands straight thinking, it grants the student the satisfaction
> of knowing when he [or she] is thinking straight.
> — D. Jackson

Mathematics is not a spectator sport.
   — Anonymous

I hear, I forget.
I see, I remember.
I do, I understand.
   — Chinese Proverb

An education is not received. It is achieved.
   — Anonymous

Exams   There will be seven 50-minute timed exams — they are all listed on the *tentative* schedule. The lowest of your seven exam scores will be dropped. The comprehensive final exam will be given on Monday, May 7 at Noon. The final exam cannot be given at any other time and also be aware that I may allow you to work longer on the final exam than just the two-hour scheduled block of time. In other words, plan your travel arrangements accordingly.

As a study aid, I have posted copies of old exams on the course web site. These are offered with no guarantees, since techniques, approaches, emphases and even notation will change slightly or radically from semester to semester. Some of the solutions contain mistakes, and some of the problem statements have typos. In other words, they are not officially part of this semester's course. In particular, I do not advocate working old exams as a primary, or exclusive, technique for learning the material in this course. **Use at your own risk**: they have not been reviewed for minor mistakes or inconsistencies with this semester's course.

Writing   This course has been designated as part of the University's Writing in the Major requirement. Thus, there will be two proofs assigned for each chapter. You will be expected to formulate a proof, and write it up clearly. These will be graded on a pass/fail basis. Each chapter's questions will be returned to you with comments, and if you do not earn a pass, then you can resubmit them the next week. You may resubmit a problem for several consecutive chapters in a row, *so long as you make a serious effort each chapter on each outstanding problem*. Once you miss submitting a retry, it will be marked as a fail. These will be due the day of the chapter exam, prior to the start of class, sent to the email address announced in class as a PDF file. You will need to use the mathematical typsetting software, LATEX, to create your proofs.

These problems **are your own work** (i.e. no collaboration on formulating the proof, or writing it), and will not be accepted late.

Reading Questions   Each section of the textbook contains reading questions at the end. Once you have read the section *prior* to our in-class discussion, submit your responses to the reading questions via electronic mail as follows. Do **not** send your responses to my regular email address (`beezer@ups.edu`), but instead use the address `linearA@beezer.privacyport.com` Your responses are due at 6 AM of the day we discuss the section in class, and will not be accepted late, i.e. 6 AM is a firm deadline. Use a subject that is **only** the acronym for the section. So for example, your first response will be simply titled: WILA. Do not include anything else in the subject line. In the first line of your response, please put your real name, then answer the questions in order. If you are not getting replies from me within 24 hours of submission, something is amiss and we will need to figure out where your responses are going. In particular, notice that the email address **does not** include the word "report."

If a question asks for a computation, you can just give the numerical answer, no need to show your work in the email. If the question requests a yes/no answer, or asks "Why?" then give an

explanation. Do your best with mathematical notation, but do not fret if it is a bit sloppy or weird, I can usually decipher any reasonable attempt. Please send *only straight text* — no attachments, no Word files, no graphics, no HTML if you can help it. Please pay careful attention to these procedures and deadlines and we will all be happier.

Grades   Grades will be based on the following breakdown: Exams — 55%; Reading Questions — 10%; Writing — 15%; Final — 20%. Homework, attendance and improvement will be considered for borderline grades. Scores will be posted anonymously on the World Wide Web at `http://buzzard.ups.edu/courses.html`.

Reminders   Three reminders about university policies contained in the *Academic Handbook*. These are described thoroughly online, or a printed copy may be requested from the Registrar's Office (basement of Jones Hall).

"Regular class attendance is expected of all students. When non-attendance is in the instructors judgment excessive, the instructor may levy a grade penalty or may direct the Registrar to drop the student from the course."
See `http://www.pugetsound.edu/student-life/student-resources/student-handbook/` `academic-handbook/registration-for-courses-of-in/#Attendance`.

Withdrawal grades are often misunderstood. A Withdrawal grade (W) can only be given during the third through sixth weeks of the semester, after that time (barring unusual circumstances), the appropriate grade is a Withdrawal Failing (WF), *even if your work has been of passing quality.* See the attached schedule for the last day to drop with an automatic 'W'.
See `http://www.pugetsound.edu/student-life/student-resources/student-handbook/` `academic-handbook/grade-information-and-policy/#withdrawal`.

All of your graded work is expected to be entirely your own work, this means reading questions and Sage exercises. Anything to the contrary is a violation of the university's comprehensive policy on Academic Integrity (cheating and plagiarism). Discovered incidents will be handled strictly, in accordance with this policy. Penalties can include failing the course and range up to being expelled from the university.
See `http://www.pugetsound.edu/student-life/student-resources/student-handbook/` `academic-handbook/academic-integrity/`.

Attendance   Daily attendance is required, expected, and overall a pretty good idea.

Purpose   This course is much different from most any mathematics course you have had recently, in particular it is much different than calculus courses. We will begin with a simple idea — a linear function — and build up an impressive, beautiful, abstract theory. We will begin computationally, but soon shift to concentrating on theorems and their proofs. By the end of the course you will be at ease reading and understanding complicated proofs. You will also be very good at writing routine proofs and will have begun the process of learning how to create complicated proofs yourself.

You will see this material applied in subsequent courses in mathematics, computer science, chemistry, physics, economics and other disciplines (though we will not have much time for applications this semester). You will gain a "mathematical maturity" that will be helpful as you pursue upper-division coursework and in any logical, rational, or argumentative activity you might engage in throughout your lifetime. It is not easy material, but your attention and hard work will be amply repaid with an in-depth knowledge of some very interesting and fundamental ideas, in addition to beginning to learn to think like a mathematician.

Tentative Daily Schedule

Monday	Tuesday	Thursday	Friday
Jan 16 MLK Day	Jan 17 Section WILA	Jan 19 Section SSLE	Jan 20 LaTeX
Jan 23 Section RREF	Jan 24 Section TSS	Jan 26 Problem Session	Jan 27 Section HSE
Jan 30 Section NM	Jan 31 Problem Session	Feb 2 Exam SLE Writing Due	Feb 3 Section VO
Feb 6 Section LC	Feb 7 Section SS	Feb 9 Section LI	Feb 10 Problem Session
Feb 13 Section LDS	Feb 14 Section O	Feb 16 Problem Session	Feb 17 Exam V Writing Due
Feb 20 Section MO	Feb 21 Section MM	Feb 23 Section MISLE	Feb 24 Section MINM
Feb 27 Problem Session Last day to drop	Feb 28 Section CRS	Mar 1 Section FS	Mar 2 Problem Session
Mar 5 Exam M Writing Due	Mar 6 Section VS	Mar 8 Section S	Mar 9 Section LISS

Mid-Term

Monday	Tuesday	Thursday	Friday
Mar 19 Problem Session	Mar 20 Section B	Mar 22 Section D	Mar 23 Section PD
Mar 26 Problem Session	Mar 27 Exam VS Writing Due	Mar 29 Section DM	Mar 30 Section PDM
Apr 2 Section EE	Apr 3 Section PEE	Apr 5 Section SD	Apr 6 Problem Session
Apr 9 Exam D&E Writing Due	Apr 10 Section LT	Apr 12 Section ILT	Apr 13 Section SLT
Apr 16 Problem Session	Apr 17 Section IVLT	Apr 19 Problem Session	Apr 20 Exam LT Writing Due
Apr 23 Section VR	Apr 24 Section MR	Apr 26 Section CB	Apr 27 Problem Session
Apr 30 Exam R Writing Due	May 1 Housekeeping		

Final Examination
Monday, May 7 at Noon