

# MATH 223: LINEAR ALGEBRA

September 2011

**SCHEDULE:** Section 102, 9:00-10:00 MWF in LSK 460

**INSTRUCTOR:** Richard Anstee

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**OFFICE HOURS:** tentatively 4-5 Tues in MATX 1118, and also 3-4 Thurs in my office, but you can try anytime (I usually arrive by 9:00)

**WEBSITE:** <http://www.math.ubc.ca/~anstee/math223/math223.html>

**TEXT:** *Linear Algebra and its Applications*, David C. Lay, 4rd edition. (Excellent for explanations; problems too elementary). Note that section 101 uses a different text with quite a different focus.

**OUTLINE:** I will not be coordinating with Section 101 but of course we cover essentially the same material. This course is aimed at excellent students who can go through the material at a faster pace than in MATH 152 or MATH 221. I usually attempt to cover all the material in both courses with additional material added. I will add some applications of linear algebra to Combinatorics in order to indicate some unexpected ways in which linear algebra can be applied. I'll also study VanderMonde determinants as used in partial fractions. A number of results will be considered in greater abstraction. I will attempt to keep the grading standards comparable to those in MATH 221 though this may involve some judicious scaling of final grades. The following is a list of topics that will certainly be covered although not exactly in the order given.

Matrix Algebra ( $2 \times 2$ case)	various Chapters. Some notes provided online.
Gaussian Elimination and some of its uses	Ch.1 (1.1, 1.2, 1.3, 1.4, 1.5, 2.2)
Determinants	Ch.3 (3.1, 3.2, 3.3)
Vector Spaces in $\mathbf{R}^n$ (also lines, planes)	Ch.4 (1.7, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)
Eigenvalues and Eigenvectors	Ch.5 (5.1, 5.2, 5.3, 5.5)
Linear Transformations and matrices	1.9, 3.3, 5.4
Orthogonality and Least Squares	Ch.6 (6.1, 6.2, 6.3, 6.4, 6.5)
(Orthogonal) Diagonalization of Symmetric Matrices	Ch.7 (7.1, 7.2)

**GRADING:** 50% final, 30% midterms, 20% assignments.

**ASSIGNMENTS:** There will be about 10 assignments. Students may work together on assignments but must write up their work independently. Copying is forbidden. Any 2 (or more) assignments with some virtually identical answers deemed the result of copying will be given 0 total credit. The students are reminded of the plagiarism policies of the University.

**MIDTERMS:** Two 50 minute midterms scheduled for Friday Oct. 7 and Friday Nov. 11 .

**FINAL:** 3 hours

**MISSED WORK:** From time to time students may be unable to finish assignments or attend midterms or the final exam. In the case of the Final Exam, the students should contact the Faculty of Science office and the missed final will be handled in a formal way. In the case of assignments, please contact me before class time on the due date, and given your reasons for the missed work. Assuming the reasons are legitimate, I will note that you will be missing the assignment. A missed midterm/quiz can be handled in a similar way, if you contact me before the test time. In such circumstances your grade is computed out of a smaller number than 100 and then scaled appropriately to get a grade out of 100. For example, if a midterm counts 15% and a student informs me in advance of legitimate reasons for missing the midterm, the student would have a

grade computed out of 85 and then this would be scaled to a grade out of 100 by multiplying by  $100/85$ . Without advance notice (to me by email or phone message to Math Office etc) the default will be a grade of 0 in the missed work but you may contact me. A student must finish a significant amount of term work in order to pass.