

# MATH 223: LINEAR ALGEBRA

September 2016

**SCHEDULE:** Section 101, 10:00-11:00 MWF in MATH ANNEX 1100

**INSTRUCTOR:** Richard Anstee

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**OFFICE HOURS:** tentatively 11-12 MWF in my office as well as 5-6 Thursdays in MATX 1118 (or Tuesdays if assignments due Wednesday), 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. Excellent for explanations; problems in general too elementary. The text is not entirely necessary since the assignments will be independent of the text. There is another text by Friedberg, Insel and Spence called *Linear Algebra*, Prentice-Hall (4th Edition) often used for MATH 223 that has a more theoretical focus and might make good supplementary reading.

**OUTLINE:** 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 give greater emphasis to theoretical some applications of linear algebra to Combinatorics in order to indicate the 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.

Linear and Matrix Algebra in $2 \times 2$ case	various Chapters. 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. 9.

**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.