

# MATH 221

## Matrix Algebra

2016W Term 2 January-April, 2017

### Course Outline:

- 1.1 Systems of linear equations
- 1.2 Row reduction and echelon forms
- 1.3 Vector equations
- 1.4 The matrix equation  $Ax = b$
- 1.5 Solution sets of linear equations
- 1.6 Applications of linear systems (skip chemical equations)
- 1.7 Linear independence
- 1.8 Introduction to linear transformations
- 1.9 The matrix of a linear transformation
- 2.1 Matrix operations
- 2.2 The inverse of a matrix (skip elementary matrices)
- 2.3 Characterizations of invertible matrices
- 2.5 Subspaces of  $\mathbb{R}^n$
- 2.6 Dimension and rank
- 3.1 Introduction to determinants
- 3.2 Properties of determinants
- 4.1 Eigenvectors and eigenvalues
- 4.2 The characteristic equation
- 4.3 Diagonalization
- 4.4 Eigenvectors and linear transformations
- 4.6 Discrete dynamical systems
- 5.1 Inner product, length, and orthogonality
- 5.2 Orthogonal sets
- 5.3 Orthogonal projections
- 5.5 Least-square problems

**Instructors:**

Section 201 (Nguyen Lam)

Section 202 (Kai Behrend)

Section 203 (Amir Esteghamatian)

Section 204 (Dan Collins)

Section 205 (Kam-Fai Tam)

The Math Department offers free drop-in [tutorials](#) for Math 221.

**Textbook:** Linear algebra and its applications, by David Lay  
(Third Custom Edition for UBC).

Any edition of *Lay* will be OK, as long as you are willing to deal with the fact the section numbers and problem numbers will vary from one edition to the next. (In fact, *any* book on matrix algebra or linear algebra would be fine: the material we cover is entirely standard.)

**Homework:** No Homework will be collected. The pages on quizzes and exams, below, will contain lists of problems you should do to prepare for the quiz or exam in question. You are strongly urged to complete as many of these practice problems as you can.

**[Webwork](#)** This links to additional practice problems which are marked online. The webwork problems do not cover every single type of problem you may encounter on an exam. These problems are entirely voluntary, marks will not contribute to your course grade.

**Marking:** Your final grade will be based on the quizzes, two midterm exams and the final exam:

Quizzes: 10%

Midterm 1: 20%

Midterm 2: 20%

Final: 50%

When computing your quiz score, the two lowest scores will be dropped. No further concession will be made, for any (including medical) reasons.

If you miss one of the midterm exams for medical reasons, you need to promptly inform the instructor, *and* provide a physician's note specifically stating that you were medically unfit to write the missed exam on that day. **No make-up exams will be given.** Your grade will be based on the other course components.

## Exams

The following applies to all exams in Math 221:

No aids of any kind: no calculators, no notes, no books.

No cell phones, no ipods, no electronic devices of any kind.