

Mathematics 2S03 Linear Algebra III
Winter Term, 2011
Course Information

Time: Tue Thu Fri 11:30-12:20 in HH/104 and Mon 9:30-10:20 in HH/305
Instructor: Dr. Hans U. Boden, HH/218E, Phone 23417
Email: boden@mcmaster.ca
Office Hours: TBA, and by appointment
Course Website: <http://www.math.mcmaster.ca/~boden/Math2S03.html>

Objective: Develop the underlying algebraic structures in abstract linear algebra. The main theorems covered will include Jordan Canonical Form, The Spectral Theorem, and Singular Value Decomposition. Emphasis will be placed on worked examples, proof techniques, and applications (in that order).

Textbooks: **1. *An Introduction to Abstract Mathematics*** by Robert J. Valenza. This is a required textbook and is available for purchase from the bookstore and online (e.g. Amazon). A copy of the book will be placed on reserve in Thode library.

2. *Schaum's Outline of Linear Algebra*, 4th Edition, by Seymour Lipschutz and Marc Lipson. This is a good reference book and is widely available for purchase. A copy will be placed on reserve Thode library.

Course Content: Groups, Fields, Vector Spaces, Linear Transformations. Eigenvalues, Eigenvectors, Diagonalization. Quotient Spaces, Invariant Subspaces, Jordan Normal Form, Applications to Linear Systems of ODEs. Dual Spaces, Dual Maps, Inner Product Spaces, Adjoint, Normal Operators, Spectral Theorem. Singular Value Decomposition. Bilinear, Quadratic, and Hermitian Forms, Sylvester's Law of Inertia.

Tests: There will be two tests and a final exam. The tests have been scheduled on the following dates, with times and rooms to be confirmed:

Test 1 Monday, Feb. 7, 18:30–20:30pm, MDCL/1110

Test 2 Monday, Mar. 14, 18:30–20:30pm MDCL/1110

Homework: You will receive weekly homework assignments, including problems to be written up and handed in. These will be collected, marked, and counted toward your "Homework" mark. Late assignments will not be marked.

In-class work: You should be prepared to discuss all assigned problems in class, and from time to time (possibly even without warning!), you may be asked to answer short quizzes on the assignments. The quiz marks will be counted toward your "In-Class" mark.

Attendance: Regular attendance and a willingness to participate in class are crucial for learning the material. An excessive number of unexcused absences will result in deductions made to your "In-Class" grade.

Assessment: Your final mark in this course will be computed as follows:

- In-Class: 24%
- Test 1: 18%
- Test 2: 18%
- Final exam: 40%

Official Policies:

1. Senate Policy Statement - You are reminded of the "Statement of Academic Ethics" and the "Senate Resolutions on Academic Dishonesty" as found in the Senate Policy Statements distributed at registration and available in the Senate Office.

2. Exemptions from course work - Students seeking an exemption for a written assignment or a test must contact the office of the Associate Dean (Studies) of their Faculty within a week from the due date of the assignment or the test date with proper documentation, e.g., a doctor's note. The instructor will act on the exemption only after receiving official communication from the relevant Associate Dean's office that the grounds for exemption have been accepted. Deferrals for the final exam are handled exclusively by the Associate Dean's office. The percentages for exempted assignments will be distributed equally to the remaining assignments. The percentages for exempted tests will be transferred to the final exam.

3. ID cards - Students must bring their McMaster ID card to every test and to the final exam for inspection.

4. Academic ethics - Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g., the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

5. Collaboration on homework - Discussions about assignments are allowed and are generally beneficial. However, you must write up solutions of the assignment problems by yourself and in your own words. Copying with minor changes (e.g., with symbols changed or with slightly different wording) from solutions prepared by another person or publication, in whatever format, is unacceptable.