
MA210E Linear Algebra
Spring 2007
Syllabus

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Office Hours: Tuesdays: 3:30PM–5:30PM; Wednesdays: 4:00PM–6:30PM; Thursdays: 5:15PM–7:45PM

Class Hours: Wednesdays: 6:30 PM – 9:00 PM

Brief Course Description:

MA210 Linear Algebra is an introduction to vector spaces and subspaces, linear dependence and independence, basis and dimension, matrix algebra, solution of equations by matrix reduction, determinants, matrix inversion, linear transformations, eigenvalues, and eigenvectors. The course also includes applications of linear algebra and a proof component, in which students learn what is needed in proofs and develop the ability to read and write proofs. Prerequisite: MA112.

Required Text: Venit, Stewart & Bishop, Wayne (1996). Elementary Linear Algebra (4th edition). Boston, MA: PWS Publishing Company.

Optional Text: Poole, David. (2003). *Linear Algebra: A Modern Introduction*. Brooks/Cole.

Course Objectives:

Students will be given an opportunity:

- To develop understanding of the basic concepts of linear algebra.
- To acquire skills in operations with vectors and matrices.
- To acquire understanding of the nature of mathematical proofs and develop skills for carrying out proofs.
- To practice problem-solving using the apparatus of linear algebra.
- To develop the ability to read mathematical text and acquire skills for independent studies.
- To develop the ability to write clearly and concisely about mathematical ideas.
- To strengthen logical thinking and the ability of operate with mathematical abstractions.

Teaching & Learning Strategies:

- The part of most class meetings will be lecture, but all students are encouraged to interact with me by asking questions and contributing ideas. Examples and hands-on activities will be given in class to illustrate concepts. Opportunities will be given for individual and collaborative work throughout the semester.
- New material will be introduced in class first. We will discuss it and work through a few examples. Your active involvement is crucial: please, participate in the discussion and contribute ideas.
- The next stage will be your work at home with your class notes and the textbook. Please, read both your notes and the assigned textbook material making sure you understand everything, study all the examples, and then do the assigned problems. If something is unclear, formulate it as a question for the next class. Group work is a great tool to use at this stage.
- At the beginning of each class, we will discuss the assignment from the previous class meeting and address all concerns and uncertainties. Please, do not leave anything unclear: we can only move forward successfully if we have no hazy areas left behind. Questions are always welcome before, during and after class time.
- The MATLAB computing tool will be introduced. You may use this tool for matrix calculations in your homework and quiz assignments.

Course Policies & Requirements:

1. You are expected to **attend all classes, arrive on time for classes, and come prepared.** Attendance will be taken at the beginning of each class meeting. If you arrive late, please, make sure your absence has been corrected. In case of illness, work-schedule conflicts, family commitments, or other emergencies that require absence from class, you are expected to notify me prior to the class meeting by sending an e-mail message, a phone message, or placing a written note in the mailbox next to my office door. If you are absent for two class meetings, you are required to set up a meeting with me to discuss the advisability of your remaining in the course (see ***The Rivier College Statement of Attendance in Appendix 1***).
2. Please, do the assigned **readings**, study the **examples**, **solve the assigned problems**, and formulate **questions** to discuss in class.
3. **Assignments** will be taken from the exercises in the text or given to you on handouts. Homework assignments are due the class meeting after they are assigned. Homework has to be handed in on the day for which it was assigned. If you cannot avoid an absence, please make sure that a friend, roommate, or classmate will deliver your homework to class, or mail it to me at **Rivier College, 420 S. Main Street, Nashua, NH 03060.** Late homework will not be accepted. All work has to be written neatly and clearly. Illegible work cannot be graded. Please, staple each home assignment.
4. You are responsible for all material on all handouts whether or not you were in attendance at the time I distributed them. Please make arrangements for other students to collect handouts for you.
5. Plan to spend **at least five hours per week outside of class** learning course materials. Depending on background and depth of inquiry, more or less time will be needed by individual students. The estimated time commitment includes reviewing class notes, reading the textbook, doing and reviewing textbook examples and assignments, and preparing for quizzes and tests.
6. Have an **e-mail account with Rivier College** and do check it regularly. I will communicate with you via e-mail.
7. Keep handouts, class notes, and assignments organized in a three-ring binder. Submit homework on 8½" by 11" paper. I prefer you use graph paper. For each section, include a heading with your name, the textbook section number, the page number, and assigned problems.
8. **OPTIONAL:** You can obtain and bring to every class meeting **a calculator that performs matrix operations**, e.g., a TI-83+. You are expected to read the manual and figure out how to make it perform all required functions.
9. **OPTIONAL:** You are encouraged to use the **MATLAB computing tool** for matrix calculations in your homework and quiz assignments. The brief MATLAB tutorials will be offered during the class sessions. (MATLAB is available in all Computer Labs on campus).
10. In every class, we will have a short written quiz. **The best 5 quiz grades will be counted.** There are no make-up quizzes.
11. We will have our **final exam on May 2.** It will be a two-hour written test. There is no make-up for the final exam.

Grading Method:

| | |
|--------------------------|-----|
| Written home assignments | 40% |
| Quizzes | 30% |
| Final exam | 30% |

Help:

There are multiple sources of help that can be used separately or in conjunction with each other to be successful in this class. Classmates are a great source of help since they are working on the material at the same time you are. I am also a source. Do not hesitate to contact me before or after class, during my office hours, by e-mail (preferably) or by phone. There are many other possibilities for assistance, such as other Rivier students, friends, neighbors and relatives. What is important is to seek help at the first sign of any confusion. Do not postpone asking questions or getting help.

N.B. You are responsible for understanding and complying with the contents of this syllabus. If you have any questions about this syllabus please raise them at the beginning of the session.

Bibliography:

- Anton, H. (1994). *Elementary Linear Algebra*. (7th edition). New York: John Wiley & Sons.
- Anton, H. and Rorres, C. (1991). *Elementary Linear Algebra: Applications Version*. (6th edition). New York: John Wiley & Sons.
- Cullen, C. (1997). *Linear Algebra with Applications*. (2nd edition). Addison-Wesley.
- Fraleigh, J. and Beauregard, R. (1995). *Linear Algebra*. (3rd edition). Reading, MA: Addison-Wesley.
- Lay, D. (1994). *Linear Algebra and Its Applications*. Reading, MA: Addison-Wesley.
- Nakos, G. and Joyner, D. (1998). *Linear Algebra with Applications*. Brooks/Cole.
- Tucker, A. (1993). *Linear Algebra: An Introduction to the Theory and Use of Vectors and Matrices*. New York: Macmillan Publishing Company.
- Williams, G. (2005). *Linear Algebra with Applications*. (5th edition). Boston: Jones and Bartlett Publishers.

MATLAB Books and Manuals:

- Poole, David. (2003). *Linear Algebra: A Modern Introduction*. Brooks/Cole.
- Palm, W. J. III. (2005). *Introduction to MATLAB 7 for Engineers*. (2nd edition). Boston, MA: McGraw-Hill.
- Chapra, S. C. (2005). *Applied Numerical Methods with MATLAB*. (2nd edition). Boston, MA: McGraw-Hill.

Tentative Course Outline:

| Dates | Topics | Reading Material |
|----------------|--|--------------------|
| January 17 | Vectors in \mathbb{R}^2 and \mathbb{R}^3 . <i>Dot</i> and <i>cross</i> products. | Sections 1.1 & 1.2 |
| January 24 | Lines and planes. Euclidean m-space. | Sections 1.3 & 2.1 |
| January 31 | Systems of linear equations. Row-reduction of linear systems. | Sections 2.2 & 2.3 |
| February 7 | Operations on matrices. Matrix equations and inverses. | Sections 3.1 & 3.2 |
| February 14 | Theory of linear systems. LU Decompositions. | Sections 3.5 & 3.6 |
| February 21 | Elementary matrices and linear systems. Definition of determinants. | Sections 3.7 & 4.1 |
| February 28 | Properties of determinants. Cramer's rule. | Sections 4.2 & 4.3 |
| March 7 | Spring Break | NO CLASSES |
| March 14 | Linear dependence and independence. Subspaces of \mathbb{R}^m . | Sections 5.1 & 5.2 |
| March 21 | Basis and dimension. Rank of a matrix. | Sections 5.3 & 5.4 |
| March 28 | Vector spaces and subspaces. Linear independence, basis, and dimension. | Sections 6.1 & 6.2 |
| April 4 | Definition of a linear transformation. Algebra of linear independence, basis, and dimension. | Sections 6.1 & 6.2 |
| April 11 | Kernel and image. | Sections 7.1 & 7.2 |
| April 18 | Eigenvalues, eigenvectors, and their applications. | Sections 7.3 |
| April 25 | Review of the course material. | |
| May 6 | Final Exam | Final Exam |

APPENDIX 1: The Statement of Attendance

The classroom is the heart of the educational experience at Rivier College because it provides, uniquely, a formal setting for the important exchanges among faculty and students. Regular and punctual attendance at all classes, essential for maximum academic achievement, is a major responsibility of Rivier College students. Failure to attend and contribute to the classroom environment significantly and demonstrably reduces the quality of the educational experience for everyone in the classroom. As a result, absences almost always impact the quality of performance.

As part of its commitment to a quality educational experience for all members of the Rivier community, the College formally requires specific attendance policies to be developed by its professors and reviewed by the Division Head and Academic Dean. Any attendance policy used by an individual professor as a criterion for evaluation must be specified in the course syllabus and presented to students

during the first week of classes. These policies can be found in respective course syllabi, and may include reasonable penalties and sanctions for excessive absences.

In the event of prolonged illness, accident, or similar emergency, it is the responsibility of the student to notify both the professor and the Office of the Academic Dean. Students must remember that it is always their responsibility to make up the work they may have missed during an absence from class. Students are directed to confer with their professors when their absences jeopardize satisfactory progress. Whenever a professor is absent without notification, students are expected to wait fifteen minutes before leaving and to sign an Attendance List, which a class member delivers to the Office of the Academic Dean.

Instructors are required to record attendance and alert the Registrar when a student fails to attend the equivalent of two weeks of courses (2 absences for a course meeting once a week, 4 absences for a course meeting twice a week, 6 absences for a course meeting three times a week). The student will then be alerted that he/she is in danger of falling under the "habitual non-attendance policy" (see below).

Habitual Non-Attendance Policy:

Habitual non-attendance is defined as an absence in any course (for any reason whatsoever) equating to three full weeks of missed class sessions (3 absences for a course meeting once a week, 6 absences for a course meeting twice a week, 9 absences for a course meeting three times a week).

It is the responsibility of the student to notify the College of any intention to withdraw from a course or withdraw from the College. The College will attempt to resolve the issue of habitual non-attendance with the student; however, the College reserves the right to withdraw students who are no longer attending classes. Habitual non-attendance in one or more classes may result in administrative withdrawal from the class or classes affected, withdrawal from the College or, in cases with extenuating circumstances, an administrative leave of absence. In such cases a grade of **W** or **NF** will be assigned to the classes affected according to the appropriate date published in the academic calendar.

Students who have attended no class sessions of a course or courses from which they are registered by the end of the drop/add period will be dropped from each class not attended. If a student never attended any courses during the drop/add period, the student will be withdrawn from his/her full schedule of courses.

APPENDIX 2: Honesty Policy

Plagiarism and cheating are serious breaches of academic honesty. In general, plagiarism is defined as the presentation of someone else's work in whatever form: copyrighted material, notes, film, art work, reports, statistics, bibliographies, and the like, as one's own, and failing to acknowledge the true source. Quoting word-for-word, or almost so, or using the argumentation of another source without acknowledging this dependence also constitutes plagiarism. Cheating is defined as the giving or attempting to give or to receive unauthorized information or assistance during an examination or in completing an assigned project. Submission of a single work for two separate courses without the permission of the instructors involved is also a form of cheating.

APPENDIX 3: Americans with Disabilities Act (ADA)

Rivier College wants to provide reasonable accommodations to students with disabilities. To accomplish this goal effectively and to ensure the best use of our resources, timely notice of a disability must be provided to the Office of Special Services for verification and for evaluation of available options. Any student whose disabilities fall within ADA should inform the instructor within the first two weeks of the term of any special needs or equipment necessary to accomplish the requirements for the course. To obtain current information on this procedure, contact the Office of Special Services at phone extension 8497.

APPENDIX 4: 24/7 Blackboard Technical Support

All students have the ability to access Blackboard technical support on a 24/7 basis. Students have many different options for obtaining support, including phone, online technical library, or Live Chat with a customer service representative. The support can be accessed by following this link:

<http://supportcenteronline.com/ics/support/default.asp?deptID=3250>