

**Linear Algebra**  
MATH 250  
Section 01  
Loyola Marymount University  
Fall 2009

*Many people who have never had occasion to learn what mathematics is  
confuse it with arithmetic and consider it a dry and arid science. In actual fact it is  
the science which demands the utmost imagination.*

–Sofya Kovalevskaya, 1890

**By registering for this course, you are agreeing to the terms  
and policies expressed in this syllabus.**

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**Office Hours:** Mondays 2:00 – 4:00 pm; Wednesdays 9 – 9:50 am; Thursdays 3 – 5 pm.  
Additional times arranged by appointment.

**Meeting times and places:** TR 9:25 – 10:40 am; University Hall 2727

**Required Textbook:** Lay, David C., *Linear Algebra and its Applications. Third Edition Update*. Pearson Education (Addison Wesley), New York, 2006.  
ISBN: 978-0321287137.

*It is your responsibility to have a copy of this textbook  
by the end of the first week of classes.*

**Prerequisites:** Math 234 or Math 248 or the equivalent. Students who received a letter grade of D in either of these courses are ***strongly encouraged*** to retake them before taking Math 250.

<b>Important Dates:</b>	October 8:	<b>Midterm Examination I</b>
	October 15:	Midterm Deficiency Reports Due
	November 6:	Last day to withdraw or apply for Credit/NoCredit
	November 19:	<b>Midterm Examination II</b>
	November 26:	No Class (Thanksgiving Break)
	December 17:	<b>Final Examination</b>

**Course Format:**

While the primary method of instruction for this course will be lecture, you will frequently be asked to participate in the lecture and in-class group or individual work. *You will be asked to present your work at the board to your classmates.* **Typically, we will not have time to discuss homework problems during class.** This course will move quickly. We will need to cover approximately one section during each class meeting. Therefore, it is imperative that you read your textbook, as we will not be able to spend time during class on all of the material in a given section.

**Course Description and Goals:**

Linear algebra dates back to the 19th century and is the art of solving systems of linear equations. Presently, linear algebra is the branch of mathematics concerned with the study of vector spaces (or linear spaces) and linear transformations. Linear algebra has extensive applications in the natural sciences and the social sciences, since nonlinear models can often be approximated by linear models. It is a central course in the mathematics discipline.

This course consists of a concrete introduction to the concepts and results of linear algebra with geometric interpretations in Euclidean space. We will cover various sections of chapters 1 – 6 in our textbook, which includes topics such as systems of linear equations, Gauss and Gauss-Jordan elimination, matrix algebra, Euclidean space and its subspaces, matrices as mappings, determinants, linear independence, general vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalization, and the geometry of Euclidean space. If time permits we will also cover inner product spaces and orthogonality.

Our course goals include acquiring facility with the various techniques, computational skills and fundamental concepts of linear algebra

Most importantly, this course seeks to:

- Improve your ability to think logically, analytically and abstractly
- Improve your ability to read, communicate (both orally and in writing), and understand the language of mathematics
- Better acquaint you with the methods of mathematics, as they are actually spoken and practiced by professionals in a wide variety of fields.

**Learning Outcomes:**

Upon successful completion of this course the student should be able to:

- understand the relationship between systems of linear equations and matrices.
- solve matrix equations using Gauss or Gauss-Jordan elimination.
- perform elementary matrix and vector operations, including addition, subtraction, multiplication, computing inverses, transposes, and determinants.
- determine if given sets are vector spaces or subspaces.

- understand the notion of linear transformation from both an algebraic and geometric standpoint, including the relationship between matrices and linear transformations.
- compute eigenvalues and eigenvectors for a given matrix (or linear transformation) and understand them geometrically.
- define and provide examples and counterexamples of the fundamental concepts of the course, including but not limited to: augmented matrix, linear combination, linear independence, span, basis, linear transformation, vector space, subspace, eigenvalue, eigenvector, orthogonality (time permitting), and inner product space (time permitting).
- better appreciate the relationships between algebra and geometry.

### **Assignments:**

Mathematics is not a spectator sport: in order to fully understand the material you need to take time to practice with the ideas, think about the concepts, and work through numerous examples and problems. Working problems on your own is the best way to learn and improve your mathematical skills. I encourage you to discuss the homework with me and your classmates, work together on your assignments, and check your solutions, but I expect that you hand in your own work: meaning that you write up your solutions independently and in your own handwriting.

*Please note that representing another person's work, including the work of an author of a solutions manual, as your own constitutes a breach of academic integrity.*

Homework will be assigned and collected on a weekly basis. Assignments will be announced in class and posted on my course website. **Homework is due on Tuesdays at the beginning of class.** Please write your assignments legibly and **staple** your pages. Write your name on each assignment. **Late homework, which means anytime after the lecture begins, will not be accepted** under any circumstances. Therefore, if you are late to class, or ill and unable to do the assignment, you will receive no credit for your homework. If you know you will miss class due to illness or for some other reason, please give your completed assignment to a classmate or slide it under my office door. Calculators and computers may be used on assignments.

You will not know ahead of time which problems will be graded, so you should give your best effort on all of them!

*Your lowest homework score will be dropped when computing your final grade.*

### **Extra Practice:**

If you find you are having difficulties with the assigned problems, or you would like extra practice with the concepts and calculations, please attempt some of the *odd* problems in your textbook so that you can compare your answers with those in the back. You should also feel free to ask me to review your solutions and provide you with comments. If you are having difficulty with any topic, please see me for help *as soon as possible*.

**Quizzes:**

A quiz will occur weekly during class on Thursdays except for weeks in which there is an examination. The quizzes will cover material from lectures given during the previous week. You may not use calculators, notes, or your text on the quizzes. Make-up quizzes will not be given under any circumstances.

*Your lowest quiz score will be dropped when computing your final grade.*

**Presentations:**

Since one of the goals of this course is to improve your ability to communicate mathematics to others, you will be responsible for presenting your solution to a homework problem at least three times during the semester. I will assign the problems to be presented in the class prior to the presentation. Your presentation will be graded on a three-point scale:

- 3 An entirely correct solution.
- 2 A solution showing strong evidence of conceptual understanding, but perhaps containing several minor computational errors.
- 1 An attempt at a solution that reveals little evidence of conceptual understanding.
- 0 No reasonable attempt made to solve the problem.

Your presentation should be aimed at your classmates and not your professor! You should feel free to come see me during my office hours to review your solution with you prior to the date of your presentation. During your presentation, you should explain your reasoning and solution and be prepared to answer any questions that your classmates may have.

**Examinations:**

The final examination occurs on **Thursday, December 17, 2009 from 8 – 10 am in University Hall 2727**. The final exam will be comprehensive. *You must receive a passing grade on the final examination to guarantee that you pass this class.* There will be two in-class midterm examinations during the semester in addition to the final examination. The midterms will take place on: **Thursday, October 8 and Thursday, November 19**. You may not use books, notes, or calculators during these examinations. I will arrange a make-up examination only in a verified extraordinary circumstance. In this case, please see me as soon as possible.

*Please contact me during the first week of the semester if you have a conflict with any of these dates!*

**Expectations:**

The author of your textbook and your professor believe that you can think! Therefore, there will not be a worked example in the text or in class that resembles *every* homework, quiz, or exam problem. You should expect to spend approximately **two hours outside of class for each hour in class** on this course. I expect that you attend and participate in

class, take careful notes, read your textbook, review your class notes, attempt every homework problem, and that you come see me if you run into any difficulties!

**Students with Disabilities:**

If you have a disability (physical, learning, or psychological) for which you are or may be requesting an accommodation, please contact me during the first week of the semester. In addition, you should visit the Disability Support Services Office in the Learning Resource Center located in Daum Hall, 2<sup>nd</sup> Floor, 310.338.4535. All discussions will remain confidential. Please visit [www.lmu.edu/dss](http://www.lmu.edu/dss) for additional information.

**Grading Policy:**

Your final course grade will be computed as follows:

Assignments:	20%
Quizzes:	10%
Homework Presentations/Class Participation:	5%
Midterm Examinations:	40%
Final Examination:	25%

*You must receive a passing grade on the final examination to guarantee that you pass this course. I guarantee at least an A- to students scoring 90% or higher, at least a B- to students scoring 80% or higher, at least a C- to students scoring 70% or higher, and at least a D to students scoring 60% or higher. I reserve the right to raise grades higher than this scale dictates, based on considerations such as homework performance, class participation, attendance, and improvement over the semester. Extra credit is not offered in this course.*

*I will not discuss grading issues via e-mail. If you have questions or concerns regarding your grade, please visit my office hours or arrange a time to meet with me.*

**Academic Integrity:**

Students are expected to abide by the Loyola Marymount University Honor Code as stated in the current Undergraduate Student Bulletin. Please familiarize yourself with the University's policy regarding academic dishonesty, which can be found on pages 58 – 59 of the 2008 – 2010 Bulletin or at

[http://www.lmu.edu/about/services/registrar/Bulletin/Academic\\_Degree\\_Requirements\\_and\\_Policies.htm](http://www.lmu.edu/about/services/registrar/Bulletin/Academic_Degree_Requirements_and_Policies.htm).

Please note that representing another person's work, including a classmate, the work of an author of a solutions manual, or using information from a website, as your own constitutes a breach of academic integrity. If the instructor concludes that a student has violated the standards for academic integrity established by the University for this course, then she may impose penalties as she deems appropriate to the offense (which can range from receiving no credit for the work in question to expulsion) and shall report the violation to the appropriate parties.

**Possible Changes:**

If necessary, this syllabus and its contents are subject to revision and **YOU** are responsible for any changes or modifications announced in class.

**Advice from former students:**

On previous course evaluations, I have asked students to answer the question: *What advice would you give a student to help them succeed in one of my courses?* Here are some of their responses:

- I would tell them to do more practice problems.
- The advice I would give is: attend class everyday, ask questions, and always do the homework.
- I'd only advise that they go to class everyday and do the homework.
- Keep up with homework and study throughout the course.
- I would tell them not to slack off on homework and be in class.

**Special Requests:**

- Please do **not** put your SSN on **anything** you give me!
- Please check your e-mail at least once a day! I occasionally will send out announcements, homework hints, etc. via e-mail and would not want you to miss out!
- The use of cellular phones, MP3 players, and other electronic equipment is strictly forbidden during class. The distractions they cause disrupt class. Cell phones must be turned OFF (not left on vibrate) and ear pieces must be removed prior to entering our classroom. If your cell phone rings, if you are seen typing a text message, or if you are seen pushing buttons on an iPod, cell phone, etc., you will be asked to leave the classroom immediately and you will receive no credit for the participation portion of your grade, or any work that was to be done in class, for that day.
- As an LMU Lion, by the Lion's Code, you are pledged to join the discourse of the academy with honesty of voice and integrity of scholarship and to show respect for staff, professors, and one another.