

MATH 225 – INTRODUCTORY MATRIX  
THEORY  
SECTION T1  
SPRING 2002

**Instructor :** Tim Huber

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**Office Hours:** T, Th, 2 - 3 p.m. + by appointment

This course will cover topics ranging from systems of linear equations, matrices and inverses to determinants, vector spaces, eigenvalues and eigenvectors. Doing well in the course will require an understanding of the fundamental theory of linear algebra and the ability to implement basic procedures. Although a demonstration of some computational proficiency will be requisite for success in the course, your ability to provide a cogent exposition and a clear understanding of the mathematics involved is much more important. Keep in mind that the course will progress quickly. Staying caught up and understanding the concepts will mean working on material daily.

**Course Prerequisites:** Math 120 or equivalent. Note that Credit is not given for both Math 225 and Math 125. Also, students with earned credit in Math 315 may not receive additional credit for Math 225, when MATH 225 is taken after Math 315.

**Required Course Materials:**

**Textbook:** *Linear Algebra and its Applications*, Second Edition, by David C. Lay

**Supplies:** A book, a brain are all that you need. However, much of the arithmetic you perform this semester can be facilitated by a graphing calculator or computer. In fact, later in your career, computers will do the calculations you perform this semester. Thus it is natural to use some technology in the course, but you should be prepared to solidify each technique in your mind through hand calculations before using a machine. To that end the use of calculators on exams and quizzes may, at times, be highly recommend or prohibited.

**Homework & Exams:** There will be two in-class exams and a cumulative final exam. Each exam will have a quiz component. Homework will be assigned at least once a week and not collected. Quizzes

will be given each week. Exam dates will be announced at least one week in advance.

**Grading Criteria:** Your final grade in this course will be based on 2 exams, a final exam, and about 12 quizzes. The quizzes will constitute 30% of the final grade. Each regular exam will count as 20% of your final grade. The final exam will be worth 30% of your final grade. We will break the final down into two exams, each worth 15%. This is summarized in the following:

<u>Component</u>	<u>Percentage</u>
Quizzes	30%
Exam 1	20%
Exam 2	20%
Final Exam	30%

**Grading Scale:** The grading scale will be at least as generous as

<u>Grade</u>	<u>Percentage</u>
A	93% – 100%
A-	90% – 92%
B+	87% – 89%
B	83% – 86%
B-	80% – 82%
C+	77% – 79%
C	73% – 76%
C-	70% – 72%
D+	67% – 69%
D	63% – 66%
D-	60% – 62%
F	0% – 59%

**Course Web Page :** Material for the course will be posted at

*[www.math.uiuc.edu/~tjhuber/math225](http://www.math.uiuc.edu/~tjhuber/math225)*

SYLLABUS      (*Each section will be covered in about one class hour*)

- Chapter 1:      Section 1.1: Systems of Linear Equations  
                   Section 1.2: Row Reduction and Echelon Forms  
                   Section 1.3: Vector Equations  
                   Section 1.4: The matrix equation  $Ax = b$   
                   Section 1.5: Solutions Sets of Linear Systems  
                   Section 1.6: Linear Independence  
                   Section 1.9: Linear Models in Business, Science, and Engineering
- Chapter 2:      Section 2.1: Matrix Operations  
                   Section 2.2: The Inverse of a Matrix  
                   Section 2.3: Characterizations of Invertible Matrices  
                   Section 2.7: The Leontief Input-Output Model  
                   **Exam 1: February 21**
- Chapter 3:      Section 3.1 : Introduction to Determinants  
                   Section 3.2: Properties of Determinants  
                   Section 3.3: Cramer's Rule, Volume and Linear Transformations
- Chapter 4:      Section 4.1: Vector Spaces and Subspaces  
                   Section 4.2: Null Spaces, Column Spaces, and Linear Transformations  
                   Section 4.3: Linearly Independent Sets; Bases  
                   Section 4.5: The Dimension of a Vector Space  
                   Section 4.6: Rank  
                   **Exam 2: April 2**
- Chapter 5:      Section 5.1: Eigenvectors and Eigenvalues  
                   Section 5.2: The Characteristic Equation  
                   Section 5.3 Diagonalization
- Chapter 6:      Section 6.1: Inner Product, Length, and Orthogonality  
                   Section 6.2: Orthogonal Sets  
                   Section 6.3: Orthogonal Projections  
                   Section 6.5: Least-Squares Problems  
                   Section 6.6: Applications to Linear Models  
                   **Final Exam**

*Exam dates listed above are tentative and subject to change. Exams will be announced in class at least one week in advance.*