

**Rochester Institute of Technology
Rochester, New York 14623**

COLLEGE OF SCIENCE
School of Mathematical Sciences

COURSE: 1016-331

- 1.0 Title:** Linear Algebra I **Date:** October 31, 2007
Credit Hours: 4
Prerequisite(s): 1016-305 or 1016-366
Co-requisite(s): None
Course proposed by: School of Mathematical Sciences

2.0 Course information:

	Contact hours	Maximum students/section
Classroom	4	35
Lab		
Studio		
Other (specify)		

Quarter(s) offered (check)

Fall **Winter** **Spring** **Summer**

Students required to take this course:

Students majoring in Applied Mathematics, Computational Mathematics, Applied Statistics, Computer Engineering, Industrial and Systems Engineering

Students who might elect to take the course:

Students pursuing a minor in mathematics (SMAP) or seeking to strengthen their technical background in mathematics.

3.0 Goals of the course (including rationale for the course, when appropriate):

- 3.1 Introduce students to matrices, their algebra, and settings in which they arise.
- 3.2 Practice developing sound logical arguments and communicating in written form.
- 3.3 Help students to mature mathematically.
- 3.4 Help students develop an understanding of the usage and application of mathematical abstraction.

4.0 Course description (as it will appear in the RIT Catalog, including pre- and co-requisites, quarters offered)

1016-331

Linear Algebra I

An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics include Gaussian elimination, matrix arithmetic, determinants, Cramer's rule, vector spaces, linear independence, basis, nullspace, row and column spaces of a matrix, eigenvalues and eigenvectors. Various applications are studied throughout the course. (1016-305 or 1016-366) **Class 4, Credit 4** (F, W, S)

5.0 Possible resources (texts, references, computer packages, etc.)

5.1 H. Anton and R. Busby, *Contemporary Linear Algebra*, John Wiley & Sons, Inc.

5.2 G. Strang, *Introduction to Linear Algebra*, Wellesley-Cambridge Press.

5.3 D. Lay, *Linear Algebra and its Applications*, Addison-Wesley.

5.4 Poole, David, *Linear Algebra: A Modern Introduction*, Thompson, Brooks/Cole

5.5 Software such as MatLab, Maple or Mathematica

6.0 Topics (outline):

6.1 Vectors

6.1.1 Basic algebra

6.1.2 Dot product, Cross Product

6.1.3 Planes in \mathbb{R}^n

6.2 Systems of linear equations

6.2.1 Gaussian elimination, pivoting and its efficiency

6.2.2 Gauss-Jordan elimination

6.2.3 Reduced row echelon form

6.3 Matrix Algebra

6.3.1 Basic operations

6.3.2 Linear systems as matrix equations

6.3.3 Inverses

6.4 Determinants

6.4.1 Definition and basic properties

6.4.2 Cramer's rule

6.5 Vector spaces

6.5.1 Definition and examples

6.5.2 Linear independence

6.5.3 Basis and dimension

6.5.4 Subspaces (including nullspace, row and column space)

6.6 Eigenvalues and eigenvectors

6.6.1 Characteristic polynomial

6.6.2 Geometric interpretation

7.0 Intended learning outcomes and associated assessment methods of those outcomes

LEARNING OUTCOMES	ASSESSMENT METHODS			
	Homework	Tests	Projects (at instructor's discretion)	Final Exam
7.1 Acquire the basic vocabulary, concepts, rules, definitions, and mathematical notation of matrix algebra.	X	X	X	X
7.2 Demonstrate the manipulative skills necessary to solve linear systems of equations.	X	X	X	X

8.0 Program or general education goals supported by this course

8.1 To develop students' understanding of the mathematical framework that supports engineering, science, and mathematics.

8.2 To acquaint students with mathematical notation and understanding of matrices and linear systems.

8.3 To develop a capacity for critical and analytical thinking.

8.4 To develop an appropriate level of mathematical literacy and competency.

9.0 Other relevant information (such as special classroom, studio, or lab needs, special scheduling, media requirements, etc.)

None

10.0 Supplemental information

None

October 2007
Revised April, 2004