ENG EK 102 Introduction to Linear Algebra for Engineers

2008-2009 Catalog Data:
ENG EK 102 Introduction to Linear Algebra for Engineers
Systems of linear equations and matrices. Vector spaces and linear transformation using matrix notation, determinants, and eigenvalues and eigenvectors. Examples drawn from engineering applications. Cannot be taken for credit in addition to CAS MA 142 or MA 242. 2 cr.

Class/Lab Schedule: 2 lecture hours per week

Status in the Curriculum: Required

Textbook(s) and/or Other Required Materials: Elementary Linear Algebra - Bernard Kolman, and David R. Hill, 7-th Edition, 2000, Prentice Hall.

Coordinator: Eytan Barouch, Professor of Mechanical Engineering

Prerequisites by topic: None

Goals:
The course objective is to combine linear algebra with analytical geometry in the context of computer-aided engineering design, analysis and manufacture. Engineering-geometry is used to introduce linear algebra, and to link mathematical abstraction with practical engineering-graphic applications. Tools of linear algebra are introduced to facilitate the analysis of engineering designs, as well as for the preparation of design data for the transformation to computer-controlled manufacture. Eigenvalues and Eigenvectors are introduced in the context of engineering-problem solving.

Course Learning Outcomes:

As an outcome of completing this course student will:
i. Learn to extract data out of an engineering problem and reformulate it in mathematical
notation amenable to mathematical problem solving
ii. Learn about mathematical abstraction as a powerful problem solving tool
iii. Learn about analytic, numeric, statistic and graphic solution methodologies

Course outcomes mapped onto Program Outcomes:

Program:	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Course:	iii	i,ii, iii			i,ii						i,ii, iii			
Emphasis:	5	5	1	1	5	1	1	1	1	1	5	1	1	1

Topics:

1. Introduction - Linear algebra as a fundamental tool of engineering.
2. Linear equations in 2- and 3-dimensional spaces.
3. Vector- and dot-product spaces.
4. Solving linear equations - a generalization.
5. Linear equations in n-dimensional space.
6. Singular systems.
7. Linear methods for Regression analysis.
8. Coordinate systems and linear transformations.
9. The eigenvalue problem - application and solution methods.

Contribution of Course to Meeting the Professional Component:
Mathematics: 100%

Status of Continuous Improvement Review of this Course:
Date Last Reviewed: Spring 2009 **Reviewed by:** ME Undergrad Comm.
Prepared by: Professor Eytan Barouch **Date:** May 15, 2009