

EEL3120 - Linear Systems

Three Credits, Four and a half hours, Engineering Topic.

Instructor: Dr. Yuriy Vlasov.

Textbook: Title: “Linear Algebra and Its Applications” 5th edition

Author: David C. Lay; Steven R. Lay; Judi J. McDonald ISBN: 978-0-321-98238-4

Publisher: Pearson Education

Specific Course Information:

EEL 3120 Introduction to Linear Systems in Engineering (3). The introductory course on linear systems deals with the use of linear algebra to analyze resistive and dynamic electric circuits.

Specific Goals for the Course

a. Specific outcomes of instruction

Upon successful completion of this course, the student will:

1. Use mathematically correct language and notation of Linear Algebra.
2. Explain, interpret and correctly apply definitions, algebraic statements, axioms, and theorems.
3. Use logical reasoning and be able to identify invalid reasoning.
4. Provide examples and counterexamples to illustrate algebraic statements.
5. Solve systems of linear equations using several different methods.
6. Apply matrix algebra and matrix operations, including inverses and determinants.
7. Demonstrate understanding of the concepts of linear algebra: linear combination, span, linear independence of vectors, vector spaces and subspaces.
8. Apply the principles of matrix algebra to linear transformations.
9. Determine eigenvalues and eigenvectors and solve eigenvalue problems.
10. Demonstrate proficiency in advanced calculations involving concepts of Linear Algebra and using modern computational tools.
11. Communicate Linear Algebra problem solutions verbally and in writing, using complete sentences to logically explain the individual steps in the solutions, the correct notation, and the appropriate units.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

In this course the student will have to show

- (a) an ability to apply knowledge of mathematics, science, and engineering (X)
- (b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (N/A)
- (c) an ability to design a system, component, or process to meet desired needs (N/A)
- (d) an ability to function in multi-disciplinary teams (N/A)
- (e) an ability to identify, formulate, and solve engineering problems (homework) (N/A)
- (f) an understanding of professional and ethical responsibility (N/A)
- (g) an ability to communicate effectively (through project reports) (N/A)
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (N/A)
- (i) a recognition of the need, and an ability to engage in life-long learning (N/A)

(j) a knowledge of contemporary issues (N/A)

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (X)

(l) a knowledge of probability and statistics (N/A)

Brief list of the topics to be covered

1. Definition of system of linear equations. REF
2. Solving linear system. REF, RREF.
3. Matrice
4. Matrix algebra
5. Linear systems and matrices. Elementary row operators.
6. Matrix inverse and solution of matrix equation $A X = B$
7. Determinant. Cramer's rule.

GRADING:

Course Requirements	Weight
Participation	5%
HW	10%
Exam No.1	25%
Exam No.2	30%
Project	30%
Overall Grade	100%

Conversion of Numerical Grade to Letter Grade

$95 \leq A \leq 100$	$83 \leq B < 86$	$70 \leq C < 76$
$94 \leq A < 90$	$80 \leq B < 82$	$60 \leq D < 69$
$87 \leq B < 89$	$77 \leq C < 79$	F: Below 60