Old Dominion University
Batten College of Engineering and Technology
Department of Electrical and Computer Engineering

ECE 695 – Topics: Linear Algebra in Engineering – Summer 2015
Course Syllabus

Course Description:

ECE 695: Topics: Linear Algebra in Engineering (3 credits). This is a graduate level course that provides an introduction to main linear algebra concepts and their engineering applications, with focus on electrical and computer engineering.

Prerequisites by topics: college algebra, calculus, analytic geometry, and familiarity with Matlab (basic knowledge).

Textbook (required):

- Gilbert Strang, *Linear Algebra and Its Applications*, Thomson/Brooks-Cole Publishing, Belmont, CA, 2006. ISBN-13: 978-0-03-010567-8.

Instructor:

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Course Goals:

1. To gain knowledge about linear algebra (terminology, main concepts, and specific methods).
2. To learn engineering applications of linear algebra, focusing on electrical & computer engineering.

Topics:

1. Solving systems of linear equations and matrices. Gaussian elimination. (Chapter 1)
2. Vectors and vector spaces. Bases and subspaces. Linear independence, dimensions, and linear transformations. (Chapter 2)
3. Orthogonality and projections. Orthogonal bases. (Chapter 3)
4. Determinants. (Chapter 4)
5. Eigenvalues and eigenvectors. (Chapter 5)
6. Singular value decomposition. Matrix norm and condition number. (Selected topics from Chapters 6 and 7).

Class Schedule:

Meeting time and place: Tuesday and Thursday 4:30 – 7:55 pm in Gornto 219. The course is also available via distance learning through web conferencing as listed in LeoOnline.

Office hours: Tuesday and Thursday 3:15pm – 4:15 pm, or by appointment.

Evaluation:

Final grade is determined based on a weighted score with the following weights:
- Homework: 10%
- Exam 1: 30%
- Exam 2: 30%
- Term paper: 30%

Homework and Exam Schedule:

Due dates for homework will be specified at the time of assignment.

Exam 1: June 4, 2015, in class, 90 minutes duration (4:30 – 6:00pm).

Exam 2: June 25, 2015, in class 90 minutes duration (4:30 – 6:00pm).

Term paper: topic to be chosen by June 2; in-class presentation June 23; final paper to be uploaded in Blackboard by June 25.

Policies:

- Problem sets and/or computer exercises assigned for homework will be announced in class and through Blackboard. Homework must be submitted at the beginning of the lecture on the day it is due. No late homework will be accepted, as solutions will be posted in Blackboard promptly after the homework is collected.
- The term paper is a formal writing and oral presentation assignment in which the students are expected to summarize how linear algebra concepts are applied in the context of an electrical and computer engineering problem. Additional details on presentation and formatting requirements for the term paper are given on next page.
- In-class exams will be closed books. Students taking the course through distance learning should arrange for proctoring through ODU distance learning office.
- Students are expected to have read and follow the ODU Honor Code. Cheating is absolutely prohibited. Students may discuss homework assignments with each other; however, submitted homework solutions and/or Matlab code are expected to be original work. Identical homework solutions from different students are not acceptable and will be penalized by taking off points from the full credit.

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Term Paper Information

All students are required to write a term paper outlining how linear algebra concepts are applied in the context of a specific electrical and computer engineering problem. The objective of the term paper is to provide students with examples of practical applications of linear algebra. Students will also do a short in-class oral presentation of their paper.

The term paper is a formal written document that should focus on a specific problem, should be based on reference articles published in established peer-reviewed archival publications, and should contain the following sections:

- title, abstract, and keywords;
- an introduction section describing the chosen problem and the linear algebra concepts associated with it, and citing relevant published references;
- separate sections presenting the details of the chosen problem and discussing the specific linear algebra concepts used in providing a solution to the chosen problem;
- conclusions summarizing the paper content.

The topic of the term paper should be chosen by June 2, the in-class oral presentation will be done on June 23, and the final paper should be uploaded in Blackboard by June 25. The paper must be prepared in the IEEE publications format using the template for *IEEE Transactions* that is available in the IEEE author digital toolbox on the IEEE website.

The paper should be original work written by the student. Verbatim quoting should be clearly indicated by using the "quotation marks" with appropriate credit to cited reference. Taking entire paragraphs verbatim or copy/pasting figures from other papers, whether cited as references or not, is not acceptable and will be penalized.

The term paper will be graded according to the following rubric:

	Unacceptable (0–4 pts.)	Marginal (5–6 pts.)	Good (7–8 pts.)	Very Good (9–10 pts.)	Points
Title, abstract, and keywords					
Introduction					
Sections on chosen problem and linear algebra					
Conclusions					
IEEE template and figures					
In-class oral presentation					