# Dongseo University

# Division of Computer Engineering

## Linear Algebra

**Instructor(s)**: Elena Tsomko            **Classroom:**
**Office:**                                          **Class Time:**
**Phone:**                                          **Office Hours:**
**Email:  hanguknara@gmail.com**

**Course Description:**
Linear algebra has wide applications in the mathematical and natural sciences, engineering, computer science, management and the social sciences. This course covers vectors, solving systems of linear equations, matrix algebra, determinants, diagonalization, vector geometry, the vector space, orthogonality, and eigenvalues and eigenvectors.

**Course Goals & Objectives:**
The goal of the course is to achieve a balance among computational skills, theory, and applications of linear algebra. At the conclusion of this course, the successful (passing) students will better understand vector spaces and inner product spaces, different examples of these spaces, matrices and their properties, and applications of linear algebra.

**Course Outline:**

- **Week  1 (31 Aug - 4 Sep): Introduction, Vectors, Linear Combinations**

- **Week  2 (7-11 Sep) : Length, Dot Products, Matrices**

- **Week  3 (14-18 Sep) : Vectors, Linear Equations, The Idea of Elimination**

- **Week  4(21-25 Sep) : Elimination Using Matrices, Rules for Matrix Operations**

- **Week  5 (28 Sep – 2 Oct) :Inverse Matrices, Factorization : A=LU**

- **Week  6 (5-9 Oct): Transposes, Permutations, Spaces of Vectors**
- **Week  7 (12-16 Oct) : The Nullspace of A, Solving Ax=b, The rank and the row reduced form**
- **Week  8 (19-23 Oct) :** Mid-Term Week

- **Week  9 (26-30 Oct) : The complete solution to Ax=b, Independence, Basis, Dimension**

- **Week 10 (2-6 Nov) : Dimensions of the Four Subspaces, Orthogonality of the Four Subspaces**

- **Week 11 (9-13 Nov) : Projections, Least Squares Approximations**

- **Week 12(16-20 Nov) : Orthogonal Bases and Gram-Schmidt, The Properties of Determinants**

- **Week 13(23-27 Nov) : Permutations, Cofactors, Cramer's Rule, Inverses, Volumes**

- **Week 14(30 Nov – 4 Dec) : Introductions to Eigenvalues, Diagonalizing a Matrix**

- **Week 15(7-11 Dec) :** Final Week

**Textbook(s)**
- Required: Introduction to Linear Algebra, 4$^{th}$ Edition, Publication early 2009, by Gilbert Strang, Wellesley-Cambridge Press and SIAM (Search the internet for PDF file of this textbook)

- Recommended: Mooc website: http://web.mit.edu/18.96

**Class Website:** e-Class

**Course Assignments & Grading:**

- *Mid-term exam : 30%*

- *Final exam : 30%*

- *Quizzes*: 10%

- *Assignments* : 5%

- *Presentation : 5%*

- *Participation 20%*

**Grading Policies:**

- Missed Exams: Make-up exams will be given only for valid and verifiable excuses. It is important to notify me before an exam that you must miss.
- Late work: All assignments must be submitted on the due date. Late assignments will not be accepted without the prior permission of the instructor.
- The homework is essential in learning linear algebra. You are encouraged to talk to other students about difficult problems – after you have found them difficult. Talking about linear algebra is healthy. But you must write your own solutions and list your collaborator on the problem set.

**Course Policies:**

- Attendance: If a student has an unexcused absent, he/she loses 1 point per 50 min class from the participation score of 20. If a student misses more than one-fourth of class contact hours for any reason, he/she cannot receive credit for the course.

- The use of calculators or notes is not permitted during the exam.
- Academic Misconduct Policy: Academic misconduct or violation of engineering ethics is unacceptable in the practice of engineering. When you graduate and practice as an engineer, you will be subject to the Code of Ethics of Engineers. While preparing to be an engineer, you are subject to specific rules regarding academic misconduct. Any form of academic misconduct will be penalized and may result in failing the course or expulsion from the university.