ECTS COURSE INFORMATION FORM

Faculty	**Faculty of Engineering**	
Program	**B.Sc. in Civil Engineering**	**Required**
	B.Sc. in Computer Engineering	**Required**
	B.Sc. in Electrical-Electronics Engineering	**Required**
	B.Sc. in Industrial Engineering	**Required**
	B.Sc. in Mechanical Engineering	**Required**

Course Code	MATH 211			
Course Title in English	Linear Algebra			
Course Title in Turkish	Lineer Cebir			
Language of Instruction	English			
Type of Course	Flipped Classroom			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	100	-	-	-
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab:-	Other:-
Estimated Student Workload	145 hours			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	None			
Expected Prior Knowledge	None			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To learn the fundamentals of matrix theory and linear algebra relevant to engineering problems.			
Course Description	This course provides general concepts on linear algebra by covering the following topics: Systems of linear equations and matrices, Gaussian elimination, matrix algebra, inverse of a matrix, elementary matrices, LU-factorization, the determinant of a square matrix, the properties of determinants, Cramer's rule, vector spaces, subspaces, linear independence, basis and dimension, change of basis, inner product spaces, orthonormal basis, linear transformations, matrix representations of linear transformations, eigenvalues and eigenvectors, diagonalization.			
Course Description in Turkish	Bu derste lineer cebir genel kavramları şu konu başlıkları altında incelenmektedir: Lineer denklem sistemleri ve matrisler, Gauss eliminasyon yöntemi, matris cebri, bir matrisin tersi, elemanter matrisler, LU ayrıştırma, bir kare matrisin determinantı, determinantın özellikleri, Cramer kuralı, vektör uzayları, alt uzaylar, lineer bağımsızlık, baz ve boyut, baz değişimi, iç çarpım uzayları, ortonormal baz, lineer dönüşümler, lineer dönüşümün matris temsili, özdeğerler ve özvektörler, köşegenleştirme.			
Course Learning Outcomes and Competencies	Upon successful completion of the course, the learner is expected to: 1. solve the systems of linear equations by using Gauss elimination; 2. compute the inverse of a square matrix and solve the systems of linear equations by using matrix inversion; 3. compute the determinant of a matrix and solve the systems of linear equations by using Cramer's rule; 4. demonstrate comprehension of the concepts of span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces;			

	5. demonstrate comprehension of linear transformations and compute their matrix representations; 6. compute the eigenvalues and the corresponding eigenvectors of a matrix.

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1,2,3,4,5,6	Exams, Quizzes/HW, Class Practices
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			
(3) an ability to communicate effectively with a range of audiences			
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Asst. Prof. Hasan Körük / September 2019	
Name of Instructors	Assoc. Prof. Hasan Körük; Dr. Leyla Parlar Ateş	
Course Contents	Week	Topic
	1.	Matrices and systems of equations
	2.	Matrices and systems of equations
	3.	Matrices and systems of equations
	4.	Matrices and systems of equations
	5.	Determinants
	6.	Determinants
	7.	Vector Spaces
	8.	Vector Spaces
	9.	Vector Spaces
	10.	Inner Product Spaces
	11.	Linear Transformations
	12.	Linear Transformations
	13.	Eigenvalues and Eigenvectors
	14.	Eigenvalues and Eigenvectors
	15.	Final Exam/Project/Presentation Period
	16.	Final Exam/Project/Presentation Period
Required / Recommended Readings	Linear Algebra and Its Applications, 5th edition/Global edition, David C. Lay et al., Pearson, 2016. Elementary Linear Algebra, Cengage Learning, 7th or 8th edition, Ron Larson, (e-book or hardcopy).	
Teaching Methods	Lectures using "flipped classroom" as an active learning technique.	
Homework and Projects	Online quizzes/HWs will be assigned	
Laboratory Work	-	

Computer Use	-
Other Activities	-
Assessment Methods	Types of Assessment — Number — Ratio (%) Midterm Exams — 2 — 75 (35+40) Online Activities (Quizzes and HWs) — 5-7 — 13 Flipped Learning Practice — 8-12 — 12 Total — - — 100
Course Administration	**Section 1:** **Assoc. Prof. Hasan Körük** **Instructor's office and phone number**: A Block-5th Floor / 0212 3953654 **Office hours:** Monday 10:00-12:00 **Email address:** korukh@mef.edu.tr **Section 2:** **Dr. Leyla Parlar Ateş** **Instructor's office and phone number**: A Block-4th Floor / 0212 3953600 **Office hours:** Wednesday 13:00-15:00 **Email address:** atesl@mef.edu.tr **Rules for attendance:** Classroom participation contributes to 12% of the final grade. **Missing a quiz/HW:** No make-up will be given. **Missing a midterm**: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given. **A reminder of proper classroom behavior, code of student conduct**: YÖK Regulations. **Academic dishonesty and plagiarism**: YÖK Regulations.

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Explanation
	No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture/Flipped Classroo	14	2	3	1	84	A*(B+C+D)
Quizzes	2	2	1		6	A*(B+C+D)
Midterm(s)	2	20	3		46	A*(B+C+D)
Homework	3	2	1		9	A*(B+C+D)
Final Examination						A*(B+C+D)
Total Workload					145	
Total Workload/25					5.8	
ECTS					**6**	