ÇANKAYA UNIVERSITY
Faculty of Arts and Sciences
Course Definition Form

Part I. Basic Course Information

Department Name	MATHEMATICS					**Dept. Numeric Code**	27
Course Code	MATH231	**Number of Weekly Lecture Hours**	2	**Number of Weekly Lab/Tutorial Hours**	2	**Number of Credit Hours**	**3**
Course Web Site	http://math231.cankaya.edu.tr					**ECTS Credit**	06

Course Name *This information will appear in the printed catalogs and on the web online catalog.*	
English Name	Linear Algebra I
Turkish Name	Lineer Cebir I

Course Description
Provide a brief overview of what is covered during the semester. This information will appear in the printed catalogs and on the web online catalog. Maximum 60 words.

Systems of Linear Equations, Row Echelon Form, Matrix Algebra, Elementary Matrices, Determinants, Vector Spaces, Linear Independence, Basis and Dimension, Row Space and Column Space, Null Spaces and Ranges, Linear Transformations, Similarity

Prerequisites (if any) *Give course codes and check all that are applicable.*	1st	2nd	3rd	4th
	☐ Consent of the Instructor	☐ Senior Standing	☐ Give others, if any.	
Co-requisites (if any)	1st	2nd	3rd	4th
Course Type *Check all that are applicable*	☒ Must course for dept. ☐ Must course for other dept.(s) ☐ Elective course for dept. ☐ Elective course for other dept.(s)			

Course Classification
Give the appropriate percentage for each category.

Category	Mathematics & Natural Sciences	Engineering & Architectural Sciences			
Percentage	80	20			

Part II. Detailed Course Information

Course Objectives
Maximum 100 words.

The purposes of the course are

1. to teach the role of matrices in the system of linear equations
2. to teach the abstract algebraic structures: vector spaces.
3. to teach the action of linear operators on vector spaces by using matrices

Learning Outcomes
Explain the learning outcomes of the course. Maximum 10 items.

Studentsshould be able to

1. classify matrices with respect to size, invertiblity.
2. write any system of lineare quations in terms of matrices.
3. solve the system of linear equations by using properties of matrices.
4. construct verctor spaces and subspaces by studying linear independent vectors.
5. view linear operators as matrices .
6. put together a mathematical argument in order to deduce/prove simple facts about vectors, matrices, vector spaces and linear maps.

Textbook(s)
List the textbook(s), if any, and other related main course material.

Author(s)	Title	Publisher	Publication Year	ISBN
D.C.Lay, S.R. Lay, J.J. McDonald	Linear Algebra and Its Applications	Pearson	2015	978-0321982384
S.H. Friedberg, A.J. Insel, L.E.Spence	Linear Algebra	Prentice Hall of India	2011	978-8120326064

Reference Books
List, ifany,otherreference books to be used as supplementary material.

Author(s)	Title	Publisher	Publication Year	ISBN
B. Kolman, D.R. Hill	Elementary Linear Algebra with Applications	Pearson	2007	978-0132296540
Steven J. Leon,	Linear Algebra with Applications	Prentice Hall	2006	978-0130337818

Teaching Policy
Explain how you will organize the course (lectures, laboratories, tutorials, studio work, seminars, etc.)

4 hours of lecturing including problem solving and applications. Attendance to the lectures is compulsory.

Laboratory/Studio Work
Give the number of laboratory/studio hours required per week, if any, to do supervised laboratory/studio work and list the names of the laboratories/studios in which these sessions will be conducted.

Computer Usage
Briefly describe the computer usage and the hardware/software requirements for the course.

Course Outline
List the weekly topics to be covered.

Week	Topic(s)
1	Matrices, Matrix Algebra, Special Types of Matrices
2	Elementary Row Operations, Row Equivalent Matrices, Elementary Matrices
3	Row Echelon Form, Invertibility and Inverse of Matrices
4	Systems of Linear Equations
5	The Determinant of a Matrix, Properties of Determinants, Cramer's Rule
6	Vector Spaces, Subspaces, Sum and direct sum of subspaces, Linear Span
7	Linear Dependence-Independence, Basis and Dimension
8	Coordinates, Change of Basis
9	Row Space, Column Space, Null Spaces and Ranges
10	Linear Transformations
11	Kernel, Range, Isomorphism
12	The Spaces of Linear Transformations, The Dual Space
13	The Matrix Representation of a Linear Transformation
14	Similarity

Grading Policy
List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.

Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage
Homework			Case Study			Attendance		
Quiz(es)	5	10	Lab Work			Field Study		
Midterm Exam	2	50	Classroom Participation			Project		
Term Paper			Oral Presentation			Final Exam	1	40

ECTS Workload
List all the activities considered under the ECTS.

Activity	Quantity	Duration (hours)	Total Workload (hours)
Attending Lectures (*weekly basis*)	14	2	28
Attending Labs/Recitations (*weekly basis*)	14	2	28
Compilation and finalization of course/lecture notes (*weekly basis*)	14	1	14
Collection and selection of relevant material (*once*)	1	6	6
Self study of relevant material (*weekly basis*)	14	1	14
Take-home assignments			
Preparation for quizzes	5	2	10
Preparation for mid-term exams (*including the duration of the exams*)	2	15	30
Preparation of term paper/case-study report (*including oral presentation*)			
Preparation of term project/field study report (*including oral presentation*)			
Preparation for final exam (*including the duration of the exam*)	1	20	20
		TOTAL WORKLOAD / 25	150/25
		ECTS Credit	**6**

Total Workloads are calculated automatically by formulas. To update all the formulas in the document firstpressCTRL+Aandthenpress F9.

Program Qualifications vs. Learning Outcomes *Consider the program qualifications given below as determined in terms of learning outcomes and acquisition of capabilities for all the courses in the curriculum. Look at the learning outcomes of this course given above. Relate these two using the Likert Scale by marking with X in one of the five choices at the right.*

No	Program Qualifications	Contribution				
		0	1	2	3	4
1	Adequate knowledge in mathematics; ability to use applied and theoretical information in these areas to solve pure and applied mathematics problems.					X
2	Ability to use modern computational tools to analyze an abstract or real life problem				X	
3	Adequate knowledge in theoretical and historical background in mathematics				X	
4	Ability to work individually and in teams efficiently, ability to collaborate effectively in teams to analyze complex systems from intra-disciplinary and multi-disciplinary areas				X	
5	Ability to communicate effectively in English about technical subjects, both orally and in writing				X	
6	Ability to use, develop and implement new experiments and algorithms to solve scientific, engineering and financial problems				X	
7	Ability to analyze a mathematical problem using both analytical and numerical methods; use and compare theoretical and simulational methods to gain deeper insight				X	
8	Ability to report the findings, conclusions and interpretations related to a project in the area of pure and applied mathematics, ability to write technical reports, to prepare and conduct effective presentations				X	
9	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to keep continuous self improvement				X	
10	Awareness of professional and ethical responsibility issues and their legal consequences					X

Scale for contribution to a qualification: **0**-none, **1**-little, **2**-moderate, **3**-considerable, **4**-highest