



COURSE INFORMATION FORM

Course Name	Course Code
CALCULUS I	151411212

Semester	Number of Course Hours per Week		ECTS
	Theory	Practice	
1	4	0	5

Course Category (Credit)				
Basic Sciences	Engineering Sciences	Design	General Education	Social
3	2	0	0	0

Course Language	Course Level	Course Type
Turkish	Undergraduate	Compulsory

<b>Prerequisite(s) if any</b>	-
<b>Objectives of the Course</b>	The Mathematics I course aims to equip students with fundamental mathematical concepts and skills, enhance their analytical thinking abilities, and lay the groundwork for advanced mathematics and engineering courses. This course aims to develop students' abilities to understand, formulate, and solve mathematical problems.
<b>Short Course Content</b>	This course covers fundamental mathematics topics: functions, limits and continuity, derivatives and their applications, integrals and their applications. Students will learn the theoretical foundations of these topics and work on various application problems. The course focuses on developing mathematical thinking and problem-solving skills.

Learning Outcomes of the Course	Contributed PO(s)	Teaching Methods *	Measuring Methods **
1 Gains the ability to understand and apply basic mathematical concepts (functions, limits, derivatives, integrals).	1	1, 5, 6, 10	A, D
2 Develops the ability to analyze, model, and solve complex mathematical problems.	1, 2	1, 5, 6, 10	A, D
3 Acquires the skill to solve real-world problems using the concepts of derivatives and integrals.	1, 2, 3	1, 5, 6, 10	A, D
4 Enhances mathematical thinking and logical reasoning skills.	1, 2, 8	1, 5, 6, 10	A, D
5 Gains the ability to solve linear algebra problems by understanding matrix theory and its applications.	1, 2	1, 5, 6, 10	A, D
6 Develops the ability to apply mathematical concepts to engineering problems.	1, 2, 3, 4	1, 5, 6, 10	A, D
7 Acquires the ability to analyze engineering systems using mathematical modeling techniques.	1, 2, 3, 4	1, 5, 6, 10	A, D
8 Enhances the skill to use mathematical software and computational tools.	4	1, 10, 11, 13	A, D
9 Gains the ability to express mathematical concepts clearly and precisely.	7	1, 11	A, D
10 Motivates continuous updating of mathematical knowledge and learning new mathematical concepts.	8	1, 2	A, D

\*Teaching Methods 1:Expression, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Trouble/Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

\*\*Measuring Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

<b>Main Textbook</b>	Thomas G.B., Weir M.D., Hass J.R., 2018, Thomas Kalkülüs, Cilt 1-2, Pearson Publications
<b>Supporting References</b>	Lecture Notes. Calculus Online Textbook, 2023, MIT OpenCourseWare. Strang G., 2016, Introduction to Linear Algebra. 5th edition, Wellesley-Cambridge Press.
<b>Necessary Course Material</b>	Laptop or desktop computer, presentation/projection device, fixed/movable projection screen, whiteboard.

<b>Course Schedule</b>	
<b>1</b>	Introduction to the course and basic mathematics
<b>2</b>	Matrices and matrix operations
<b>3</b>	Mathematical modeling
<b>4</b>	Algebraic functions and their graphs
<b>5</b>	Transcendental functions and their graphs
<b>6</b>	Limit I: Rate of change, one-sided limits, cases where limit does not exist
<b>7</b>	Limit II: Limit at infinity, asymptotes, continuity
<b>8</b>	Mid-Term Exam
<b>9</b>	Derivative I: Definition of the derivative, one-sided derivative, derivative rules
<b>10</b>	Derivative II: Higher-order derivatives, rates of change, applications
<b>11</b>	Derivative III: Chain rule, implicit differentiation, related rates, linearization
<b>12</b>	Derivative IV: Differentials, Derivatives of Transcendental Functions
<b>13</b>	Applications of derivatives I: Extrema of functions, monotonic functions, concavity and curve sketching
<b>14</b>	Applications of derivatives II: Mean value theorem, applied optimization problems
<b>15</b>	Applications of derivatives III: Newton-Raphson method, indeterminate forms, and L'Hôpital's rule
<b>16,17</b>	Final Exam

<b>Calculation of Course Workload</b>			
<b>Activities</b>	<b>Number</b>	<b>Time (Hour)</b>	<b>Total Workload (Hour)</b>
Course Time (number of course hours per week)	14	4	56
Classroom Studying Time (review, reinforcing, prestudy,...)	14	4	56
Homework	4	2	8
Quiz Exam	0	0	0
Studying for Quiz Exam	0	0	0
Oral exam	0	0	0
Studying for Oral Exam	0	0	0
Report (Preparation and presentation time included)	0	0	0
Project (Preparation and presentation time included)	0	0	0
Presentation (Preparation time included)	0	0	0
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	10	10
Final Exam	1	2	2
Studying for Final Exam	1	15	15
<b>Total workload</b>			<b>149</b>
<b>Total workload / 30</b>			<b>4.97</b>
<b>Course ECTS Credit</b>			<b>5</b>

Evaluation	
<b>Activity Type</b>	<b>%</b>
Mid-term	30
Homework	20
<b>Final Exam</b>	50
<b>Total</b>	100

RELATIONSHIP BETWEEN THE COURSE LEARNING OUTCOMES AND THE PROGRAM OUTCOMES (PO) (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)		
NO	PROGRAM OUTCOME	Contribution
1	Sufficient knowledge in mathematics, science, and fundamental engineering; ability to apply theoretical and practical knowledge in these fields to model and solve Engineering problems.	5
2	Skills to identify, define, formulate complex engineering problems in civil engineering and related fields, and to select and apply appropriate analysis and modeling methods to solve them.	4
3	Ability to design a complex system, device, or product under realistic constraints and conditions, applying modern design methods towards a specified goal.	4
4	Ability to develop, select, and use modern techniques and tools necessary for Civil Engineering applications, and to effectively utilize information technologies.	2
5	Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the investigation of Civil Engineering problems.	1
6	Ability to work effectively in intra-disciplinary and inter-disciplinary teams.	1
7	Effective communication skills in Turkish, both oral and written, and ability to use/improve knowledge of a foreign language.	1
8	Recognition of the need for lifelong learning; ability to access information, follow developments in science and technology, and continuously renew oneself.	3
9	Consciousness of professional and ethical responsibility.	1
10	Knowledge about business life practices such as project management, risk management, and change management; awareness about entrepreneurship, innovation, and sustainable development.	1
11	Knowledge about the effects of engineering practices on health, environment, and safety in universal and societal dimensions; awareness about national and international legal regulations and standards, and the legal consequences of engineering solutions.	1

LECTUTER(S)				
<b>Prepared by</b>	Dr. Kadir Berkhan AKALIN	Dr. Ömer KARAGÖZ		
<b>Signature(s)</b>				

Date:23.07.2024