School of Engineering and Natural Sciences / Computer Engineering (English)

2022 - 2023 Academic Year

CALCULUS II

Syllabus

Course Description						
Name	**Code**	**Semester**	**T+A Hour**	**Credit**	**ECTS**
CALCULUS II	COE1110751	Fall Semester	4+0	4	6

Prerequisites Courses	MATEMATİK I
Recommended Elective Courses	
Language of Instruction	English
Course Level	First Cycle (Bachelor's Degree)
Course Type	Required
Course Coordinator	Assist.Prof. Özge BİÇER ÖDEMİŞ
Name of Lecturer(s)	Lect. Seçil TUNALI ÇIRAK, Prof.Dr. Bahadır Kürşat GÜNTÜRK
Assistant(s)	
Aim	To teach fundamental math contents, methods and techniques, and its applications for the study of Engineering.
Course Content	This course contains; Techniques of Integration: Basic Integration Formulas, Integration by Parts, Partial Fractions,Techniques of Integration: Trigonometric Substitutions, L'Hopital's Rule,Techniques of Integration: Improper Integrals ,Infinite Sequences and Series: Limits of Sequences of Numbers, Subsequences,Infinite Sequences and Series: Bounded Sequences, Infinite Series ,Infinite Sequences and Series: Series of Nonnegative Terms, Alternating Series ,Infinite Sequences and Series: Absolute and Conditional Convergence, Power Series, Taylor and Maclaurin Series ,Polar Coordinates: Polar coordinates and graphs, Calculus of Polar Curves ,Vectors and Geometry of Space: Cartesian (Rectangular) Coordinates and Vectors in Space, Dot and Cross Products, Lines and Planes in Space, Cylinders and Quadric Surfaces ,Vectors and Geometry of Space: Vector-Valued Functions and Space Curves, Arc Length and the Unit Tangent Vector ,Partial Derivatives: Functions of Several Variables, Limits and Continuity in Higher Dimensions, Partial Derivatives, The Chain Rule ,Partial Derivatives: Directional Derivatives, Gradient Vectors and Tangent Planes, Extreme Values and Saddle Points, Lagrange Multipliers ,Multiple Integrals: Double Integrals, Areas, Double Integrals in Polar Form, Triple Integrals in Rectangular Coordinates ,Multiple Integrals: Triple Integrals in Cylindrical and Spherical Coordinates, Substitutions in Multiple Integrals.

Course Learning Outcomes	**Teaching Methods**	**Assessment Methods**
1. Define polar coordinates and the polar curves and explain the relationship between polar and cartesian coordinates. Explain area, slope, equations of tangent-normal line and (arc)length in polar curves.	1, 14, 15	A, C
2. Define the concepts of three-dimensional coordinate systems. Identify vectors. Define and apply dot product and cross product and explain their features. Define lines and planes in space and explain their relationship. Explain and define cylindrical and quadratic surfaces.	1, 14, 15	A, C
3. Understand the multivariable functions, analyze limits, determine continuity, and compute partial derivatives of them; find tangent planes, directional derivatives, gradients; apply the second partials test, and Lagrange multipliers to approximate and solve optimization problems.	1, 14, 15	A, C
4. Compute multiple integrals and use multiple integrals when calculating area and volume.	1, 14, 15	A, C
5. Determine the convergence of sequences and series, compute the radius of convergence of power series, represent a known function as a Taylor series; approximate a known function with a Taylor polynomial and determine the error involved.	1, 14, 15	A, C

Teaching Methods	1: Lecture, 14: Self-Study, 15: Problem solving
Assessment Methods	A: Written Exam, C: Homework

Lecture Schedule

Sequence	**Topics**	**Preliminary Preparation**
1	Techniques of Integration: Basic Integration Formulas, Integration by Parts, Partial Fractions	
2	Techniques of Integration: Trigonometric Substitutions, L'Hopital's Rule	
3	Techniques of Integration: Improper Integrals	
4	Infinite Sequences and Series: Limits of Sequences of Numbers, Subsequences	
5	Infinite Sequences and Series: Bounded Sequences, Infinite Series	
6	Infinite Sequences and Series: Series of Nonnegative Terms, Alternating Series	
7	Infinite Sequences and Series: Absolute and Conditional Convergence, Power Series, Taylor and Maclaurin Series	
8	Polar Coordinates: Polar coordinates and graphs, Calculus of Polar Curves	
9	Vectors and Geometry of Space: Cartesian (Rectangular) Coordinates and Vectors in Space, Dot and Cross Products, Lines and Planes in Space, Cylinders and Quadric Surfaces	
10	Vectors and Geometry of Space: Vector-Valued Functions and Space Curves, Arc Length and the Unit Tangent Vector	
11	Partial Derivatives: Functions of Several Variables, Limits and Continuity in Higher Dimensions, Partial Derivatives, The Chain Rule	
12	Partial Derivatives: Directional Derivatives, Gradient Vectors and Tangent Planes, Extreme Values and Saddle Points, Lagrange Multipliers	
13	Multiple Integrals: Double Integrals, Areas, Double Integrals in Polar Form, Triple Integrals in Rectangular Coordinates	
14	Multiple Integrals: Triple Integrals in Cylindrical and Spherical Coordinates, Substitutions in Multiple Integrals	

Evaluation Methods	**Weight(%)**
Midterm Exam	30
General Exam	70

Resources
Thomas' Calculus, 12th ed., G. B. Thomas, Jr. and M. D. Weir and J. Hass, Addison-Wesley