

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

2023 - 2024 Academic Year

CALCULUS II

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
CALCULUS II	IND1210751	Spring Semester	4+0	4	6
Prerequisites Courses	MATEMATİK I; GENEL 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)	Assist.Prof. Mohamed Khaled Mohamed Ismail KHALIFA				
Assistant(s)					
Aim	To teach fundamental math contents, methods and techniques, and its applications for the study of Engineering.				
Course Content	This course contains; Parametric Equations and Polar Curves, Parametric Equations and Polar Curves, Vectors and Geometry of Space: Vectors in Space, Dot and Cross Products, Lines and Planes in Space, Cylinders and Quadric Surfaces, Vectors and Geometry of Space: Vectors in Space, Dot and Cross Products, Lines and Planes in Space, Cylinders and Quadric Surfaces, Functions of Several Variables: Limits and Continuity, Partial Derivatives, Directional Derivative, Functions of Several Variables: Limits and Continuity, Partial Derivatives, Directional Derivative, Extreme Values of Multivariable Functions, Lagrange Multiplier, Extreme Values of Multivariable Functions, Lagrange Multiplier, Multiple Integrals: Double Integrals, Areas, Double Integrals in Polar Form, Triple Integrals in Rectangular, Cylindrical and Spherical Coordinates, Multiple Integrals: Double Integrals, Areas, Double Integrals in Polar Form, Triple Integrals in Rectangular, Cylindrical and Spherical Coordinates, Infinite Sequences: Limits of Sequences of Numbers, Subsequences, Monotonic Sequence Theorem, Infinite Sequences and Series: Series of Nonnegative Terms, Alternating Series, Absolute and Conditional Convergence, Power Series: Interval of Convergence, Radius of Convergence, Term by Term Differentiation, Term by Term Integration, Taylor Series.				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
1. Use the concept of polar coordinates to find areas, arc length of curves, and representations of conic sections.			12, 14, 9	A, E	
2. Apply dot or cross product to calculate angles between vectors, orientation of axes, areas of triangles and parallelograms in space, scalar and vector projections, volumes of parallelepipeds and distance between a point and a plane in the space.			12, 14, 9	A, E	
3. Recognize multivariable functions to compute limits, partial derivatives and directional derivatives, extreme values, tangent planes graphically, numerically and algebraically.			12, 14, 9	A, E	
4. Use multiple integrals to compute areas and volumes.			12, 14, 9	A, E	
5. Determine convergence or divergence of sequences and series.			12, 14, 9	A, E	
6. Find Power and Taylor Series of a function.			12, 14, 9	A, E	
Teaching Methods	12: Problem Solving Method, 14: Self Study Method, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam, E: Homework				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Parametric Equations and Polar Curves	Polynomial functions, Power functions, Trigonometric functions, Derivative of a function, Chain rule.			
2	Parametric Equations and Polar Curves	Polynomial functions, Power functions, Trigonometric functions, Derivative of a function, Chain Rule.			
3	Vectors and Geometry of Space: Vectors in Space, Dot and Cross Products, Lines and Planes in Space, Cylinders and Quadric Surfaces	Equations of lines and circles, Real space			
4	Vectors and Geometry of Space: Vectors in Space, Dot and Cross Products, Lines and Planes in Space, Cylinders and Quadric Surfaces	Equations of lines and circles, Real space.			
5	Functions of Several Variables: Limits and Continuity, Partial Derivatives, Directional Derivative	Single Variable Functions, Limit and Continuity, Derivative			
6	Functions of Several Variables: Limits and Continuity, Partial Derivatives, Directional Derivative	Single Variable Functions, Limit and Continuity, Derivative			
7	Extreme Values of Multivariable Functions, Lagrange Multiplier	Derivative, Extreme Values of Single Variable Functions			
8	Extreme Values of Multivariable Functions, Lagrange Multiplier	Derivative, Extreme Values of Single Variable Functions			
9	Multiple Integrals: Double Integrals, Areas, Double Integrals in Polar Form, Triple Integrals in Rectangular, Cylindrical and Spherical Coordinates	Definite Integrals, Polar Coordinates			
10	Multiple Integrals: Double Integrals, Areas, Double Integrals in Polar Form, Triple Integrals in Rectangular, Cylindrical and Spherical Coordinates	Definite Integrals, Polar Coordinates			
11	Infinite Sequences: Limits of Sequences of Numbers, Subsequences, Monotonic Sequence Theorem	Functions, Limit			
12	Infinite Sequences and Series: Series of Nonnegative Terms, Alternating Series, Absolute and Conditional Convergence				
13	Power Series: Interval of Convergence, Radius of Convergence, Term by Term Differentiation, Term by Term Integration	Absolute Value, Integral, Derivative			
14	Taylor Series				
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