

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

2024 - 2025 Academic Year

CALCULUS III

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
CALCULUS III	BME3210783	Spring Semester	3+0	3	6
Prerequisites Courses	MATEMATİK II				
Recommended Elective Courses	Electromagnetics				
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Assoc.Prof. Hüseyin Şerif SAVCI				
Name of Lecturer(s)	Assoc.Prof. Hüseyin Şerif SAVCI				
Assistant(s)					
Aim	1. To provide the concepts of polar coordinates and limit, continuity, integral of vector valued functions. 2. To provide the applications of multiple integrals. 3. To compute the line integrals and surface integrals and apply Green's theorem, Stokes Theorem and Divergence Theorem				
Course Content	This course contains; Vector Valued Functions; Derivatives and Integrals of Vector Functions (T,N,B vectors), Directional Derivatives and the Gradient Vector, Maxima and Minima in Several Variables, Extrema of Functions, Lagrange Multipliers, Vector Fields, Line Integrals, Green's Theorem, Curl and Divergence, Parametric Surfaces and their Areas, Stoke's Theorem and Summary of Vector Calculus, Two Null Identities, Field Classification and Helmholtz's Theorem, Introduction to Electrostatic in Free Space and Coulomb's Law, Gauss Law and Applications, Electric Potential, Material Media in Static Electric Field, Flux Density, and Dielectric Constant, Electric Flux Density and Dielectric Constant, Capacitance and Capacitors and Electrostatic Energy and Forces.				
Course Learning Outcomes		Teaching Methods		Assessment Methods	
Compute the standard representation of a vector in 3-space, compute the dot product and cross product of vectors; write equations of lines, planes and quadric surfaces in 3-space.		12, 14, 9		A, E	
Use the concepts of continuity, differentiation, and integration of vector-valued functions.		12, 14, 9		A, E	
Compute multiple integrals over rectangular coordinates, nonrectangular coordinates and in other coordinate systems; apply multiple integrals in problems involving area, volume and surface area		12, 14, 9		A, E	
Compute line integrals and surface integrals and apply Green's theorem, Stokes Theorem and Divergence Theorem		12, 14, 9		A, E	
Understanding of electrostatic in free space		12, 14, 9		A, E	
Understanding of electric flux and its relation with dielectric constant		12, 14, 9		A, E	
Understanding of electrostatic energy and its storage via capacitors		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	Vector Valued Functions; Derivatives and Integrals of Vector Functions (T,N,B vectors)				
2	Directional Derivatives and the Gradient Vector				
3	Maxima and Minima in Several Variables, Extrema of Functions				
4	Lagrange Multipliers, Vector Fields				
5	Line Integrals, Green's Theorem				
6	Curl and Divergence				
7	Parametric Surfaces and their Areas				
8	Stoke's Theorem and Summary of Vector Calculus				
9	Two Null Identities, Field Classification and Helmholtz's Theorem				
10	Introduction to Electrostatic in Free Space and Coulomb's Law				
11	Gauss Law and Applications, Electric Potential, Material Media in Static Electric Field				
12	Flux Density, and Dielectric Constant				
13	Electric Flux Density and Dielectric Constant				
14	Capacitance and Capacitors and Electrostatic Energy and Forces				
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources	
Thomas' Calculus, 12th Edition, G.B Thomas, R. L. Finney, M.D.Weir, F.R.Giordano, Addison1. Fundamentals of Engineering Electromagnetics by David Cheng, First edition (main text for Electromagnetism)	
2. Vector Calculus, 4th edition, Susan Jane Colley, Pearson edn.	