School of Engineering and Natural Sciences / Electrical and Electronics Engineering (English)

2024 - 2025 Academic Year

CALCULUS III

Syllabus

Course Description						
Name		**Code**	**Semester**	**T+A Hour**	**Credit**	**ECTS**
CALCULUS III		EEE2210783	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	Required					
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 functions2. To provide the applications of multiple integrals3. 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 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.