Republic of Iraq

Ministry of Higher Education and Scientific Research
Supervision and Scientific Evaluation Apparatus

University: Shatt Al-Arab University
College: Engineering College
Department: Civil Engineering
Stage: 2nd stage
Lecturer name: Nabil Najem AlHamdani
Academic title: Lecturer

Course Weekly Outline

Name	Mr.Nabil Najem AlHamdani			
E-mail address	nabil.najm@sa-uc.edu.iq			
Course name	Applied Mathematics			
Course objective	The course aims to provide principles about Polar coordinates, Vectors, Partial derivatives, Double and triple integration, Series and their engineering applications.			
Course description	Knowledge and Understanding 1- Understanding polar coordinates and their relation to Cartesian coordinates and their applications. 2- Studying vectors and use them to study the analytic geometry of space with their important applications in engineering. 3- Studying different types of series and their applications in solving different engineering and mathematical problems 4- Using partial differentiation in deriving different surface equations, rate of change, optimization problem and estimation of change. 5- Studying and using multiple integral and their applications in civil engineering such as determining areas, volumes, center of masses and moments of inertia.			
References	Thomas' Calculus, George B. Thomas			
External sources	Calculus, Edwin Herman and Gilbert Strang			
Course assessment	**Lab.**	**Quizzes and assessment**	**Mid-term exam**	**Final exam**
		40	**10**	**50**
General notes				

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Week No.	Theoretical	Experimental	Aims
1	Definition of Polar Coordinates, Polar Equations and Graphs, Relating Polar and Cartesian Coordinates, Graphing Polar Coordinate Equations		The course aims to provide principles about Polar coordinates, Vectors, Partial derivatives, Double and triple integration, Series and their engineering applications.
2	Areas and Lengths in Polar Coordinates		
3	Vectors and the Geometry of Space, Component Form and Vector Algebra Operations		
4	Unit Vectors, Midpoint of a Line Segment, Navigation, forces action on a single object		
5	The Dot Product, Angle Between Vectors, orthogonal Vectors, work and Vector Projections		
6	The Cross Product, Calculating the Cross Product as a determinant, Area of a Parallelogram and Torque, Lines and Planes in Space		
7	Infinite Sequences and Series, Infinite Series, Taylor and Maclaurin Series,		
8	Power Series, The Binomial Series and Applications of Taylor Series		
9	Partial Derivatives, Limits and Continuity in Higher Dimensions, Partial Derivatives of a Function of Two and Three Variables Second-Order and higher Partial Derivatives.		
10	The Chain Rule, Directional Derivatives and Gradient Vectors, Tangent Planes and Differentials, Estimating Change in a Specific Direction		
11	Extreme Values and Saddle Points, optimization		
12	Double Integrals in Cartesian and Polar Form, Area by		

	Double Integration		
13	Triple Integrals, Area, volume, centroid and moment of inertia		
14	Triple Integrals in Cylindrical and Spherical Coordinates		
15	Preparatory week before the final Exam		