

Detailed Course Description - Course Plan Development and Updating Procedures/ Mathematics Department	QF01/0408-3.0E
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Faculty	Faculty of Science and Information Technology	Department	Mathematics
Course number	0101205	Course title	Calculus III for Engineering
Number of credit hours	3	Pre-requisite/co-requisite	Calculus II for Engineering 0101104

Brief course description

Topics include the concepts of 3-dimensional space, vectors, lines and planes. Functions of two or more variables, partial derivatives and multiple integrals.

Course goals and learning outcomes

Goal 1	Learn to work with vectors in two and three dimensional spaces.
Learning outcomes	<p>1.1 Compute the distance between points, the distance from a point to a line, and the distance from a point to a plane in the three-dimensional coordinate system.</p> <p>1.2. Sketch and describe regions in space.</p> <p>1.3. Perform algebraic operations with vectors in two and three dimensions.</p> <p>1.4. Find the length of a vector, compute dot and cross product of vectors, find scalar and vector projections of a vector onto another, find the angle between two vectors</p> <p>1.5 Find equations of lines and planes in space.</p>
Goal 2	Learn to work with multivariable functions.
Learning outcomes	<p>2.1 Find the domain and range of a multivariable function.</p> <p>2.2. Evaluate the limit of a multivariable function and determine if it is continuous.</p> <p>2.3 Compute partial and directional derivatives.</p> <p>2.4 Find the equation of a tangent plane to a surface at a given point.</p> <p>2.5. Find the gradient vector of a multivariable function</p> <p>2.6. Find and classify the critical points of a multivariable function, find local and extreme values of two-variable functions.</p>
Goal 3	Learn to evaluate multiple integrals.
Learning outcomes	<p>3.1 Compute double integrals over rectangles and over general regions, use double integrals to compute volume of solids and areas of plane regions.</p> <p>3.2 Change a double integral to polar coordinates</p> <p>3.3 Compute triple integrals over rectangular boxes and general surfaces.</p> <p>3.4 Use triple integrals to find the volume of a solid.</p> <p>3.5 Evaluate triple integrals in cylindrical and spherical coordinates.</p>

Textbook	Calculus, 8th edition By Howard Anton, Irl Bivens and Stephen Davis.
Supplementary references	1) A First Course in Differential Equations with Applications". By W.R. Derrick and S.I. Grossman, 3 ^{ed} Edition, 1987
	1) CALCULUS "Second Edition,, Finney and Thomas.
	2) "Calculus: One and Several Variables" Salas: John Wiley, 4th Edition (1982).

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3) "Vector Calculus" Susan Colley. Pearson Prentice Hall, 3rd Edition (2006).
4) Calculus By Swokowski, Olinick, and Pence. PWS Pub. Com. Boston.

Course timeline			
Week	Number of hours	Course topics	Pages (textbook)
01	1 1 1	Polar coordinates. Graphs in polar coordinates	721-735
02	1 1 1	Rectangular coordinates in 3-space. Introduction to vectors, Norm of a vector.	790 – 808
03	1 1 1	Dot product, Cross product.	808 – 828
04	1 1 1	Lines and Planes in 3-space	828 – 842
05	1 1 1	Quadratic Surfaces First exam 20%	743-854
06	1 1 1	Functions of several variables and level curves. Domain and range of functions of several variables	928 - 940
07	1 1 1	Limits of functions of several variables. Continuity of functions of several variables.	940 – 949
08	1 1 1	Partial Derivatives. Chain Rule and implicit differentiation.	949-982
09	1 1 1	Directional derivatives, gradient and tangent planes.	982-1000
10	1 1 1	Extrema of functions of several variables. . Second exam 20%	1000-1012
11	1 1 1	Double integrals. Double integrals over non-rectangular regions.	1022-1039
12	1 1 1	Double integrals in polar coordinates. Solving exercises.	1039-1047

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13	1 1 1	Triple Integrals in rectangular coordinates.	1060-1079
14	1 1 1	Triple Integrals in cylindrical coordinates.	1080-1083
15	1 1 1	Triple Integrals in spherical coordinates	1083-1090
16	1 1 1	Final Exam 50%	

Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	Practical (clinical) course evaluation methods	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%
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Approved by head of department		Date of approval	
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Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	Amer Dababneh	Office Number	9127
Phone number (extension)		Email	dababneh.amer@zuj.edu.jo
Office hours			