

College of Science
Department of Mathematics
Course syllabus: Calculus (3)
First semester 2019/2020

1. Instructor Information:

Instructor Name	Poof. Ahmad al-omari		
Office Hours	Sunday ,Tuesday, Thursday	11:00 – 10:00 2:00 – 1:00	
	Monday, Wednesday	9:30 – 9:00 1:00 – 12:30	
Office Number and Telephone Extension	2111		
Email	omarimutah@yahoo.com		

2. Course Description:

Three dimensional space: rectangular coordinates, spheres, cylindrical surfaces, quadratic surfaces; vectors: dot product, projections, cross product; parametric equations of lines; planes in 3-space; vector valued functions: calculus of vector valued functions, change of parameters, arc length, unit tangent and normal vectors, curvature; functions of two or more variables: domain, limits, and continuity, partial derivatives, the gradient, directional derivatives, tangent planes, normal lines; maxima and minima of functions of two variables; Lagrange multiplier; multiple

3. Course Information:

Course number: 401201	Course Title: Calculus (3)	Level : second year
Course Nature: Theoretical	Prerequisite: None	Lecture time:
Academic year: 2019 – 2020	Semester:	Credit Hours: 3

4. Course Objectives:

After completing this course, students should demonstrate competency in the following skills:

- Apply vector operations including addition, scalar multiplication, dot products and cross products.
- Resolve a vector into its coordinate components and find the length and magnitude of a vector.
- Determine the angle between two vectors.
- Find the area of a parallelogram using the cross product.
- Solve applications using vector operations.
- Represent a curve in space parametrically.
- Describe motion in space with parametric equations.
- Find the velocity of a moving particle from its position vector.
- Find the acceleration of a moving particle from its position vector.
- Determine the parametric equation of a line through a point in space.
- Find the length of a curve in space.
- Draw a vector field in the plane and draw flow lines of a vector field.
- Identify quadratic functions in three variables with quadric surfaces and sketch their graphs.
- For a function of 2 or 3 variables, find the domain and range; find and sketch the level curves for the function.
- Determine limits and continuity of functions of 2 or 3 variables.
- Calculate and interpret first and second partial derivatives.
- Find, interpret, and apply the gradient of a function of 2 or 3 variables.
- Find and classify critical points of a function of 2 variables as maxima, minima, or saddle points.
- Find absolute extrema for functions of several variables.

5. Intended Student Learning Outcomes:

Successful completion of the course should lead to the following outcomes:

1. Perform operations with vectors in two and three dimensional space and apply to analytic geometry
2. Differentiate and integrate vector-valued functions and apply calculus to motion problems in two and three dimensional space
3. Determine the limits, derivatives, gradients, and integrals of multivariate functions

. A analyze, solve and interpret the various applications

6. Course Content:

	The Weeks	The Subjects
CHAPTER 1 (12) VECTORES	1	Cartesian Space Coordinates, Displacements, Vectors.
	2	The Dot Product and its Properties. The Cross Product and its Properties
	3	Lines: Vector Parameterization, Symmetric Form, Intersecting and Parallel Lines, Distance from a point to a line.
	4	Planes: Scalar equations of a Plane, The Planes Determined by Three Noncollinear points, Intersecting and Parallel Planes.
CHAPTER 2 (13) VECTORES CALCULUS	5	Vector Functions: Limit, Continuity, Differentiability and Integral of Vector Functions, Differentiation Formulas. Curves: Tangent vector, Tangent Lines
	6	Intersecting Curves, the Unit Tangent, the Principal Normal; the Osculating plane .Arc Length Formula. Curvilinear Motion from a vector Viewpoint. Curvature.
CHAPTER 3 (14) FUNCTIONS OF SEVERAL VARIABLES	8	Elementary examples, Domain and the Range of Functions of Several Variables. Quadric Surfaces. Level curves and Level surfaces,
	9	Partial Derivatives. Open Sets and Closed Sets.
	10	Limits and Continuity ; Equality of Mixed Partial
CHAPTER 4 (15) GRADIENT; EXTREM VALUES; DIFFERENTIALES	11	Differentiability and Gradient. Directional Derivative.
	12	The Mean-Value Theorem; Chain Rule.
	13	The Gradient as a Normal; Tangent Lines and Tangent Planes.
	14	Maximum and Minimum Values. Maximum and Minimum Values with Side Conditions.
	15	Differentials.
	16	Reconstructing a Function From its Gradient.

7. Teaching and learning Strategies and Evaluation Methods:

Learning Outcomes	Teaching Strategies	learning Strategies	Evaluation Methods
1) Learn the general concept of vectors and its applications to real-world situations. 2) Learn the concepts of the derivative and its	- Writing on the blackboard - Ask students questions and discuss them	Give homework assignments	- Classroom presentations - Discussion

underlying concepts such as limits and continuity.	- Solve various issues		- First exam
1) Learn the concepts of the partial derivative and its underlying concepts such as limits and continuity. 2) Learn to calculate derivative for various type of functions using definition and rules.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - Second exam
1) Apply the concept of derivative to completely analyze graph of a function. 2) Learn about various applications of the derivative in applied problems.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	
1) Learn about anti-derivative and the Fundamental Theorem of Calculus and its applications. 2) Learn to use concept of integration to evaluate geometric area and solve other applied problems.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - Final exam

8. Assessment:

Assessment	Grade Proportion	Week/Dates
Class Work (Quizzes, Homework and Attendance of the lecture)		
First exam	25 %	7th Week
Second exam	25 %	12th Week
Final exam	50 %	End of Semester
Total	100 %	

9. Text Book:

The main reference	Calculus, EARLY TRANSCENDENTALS
Author(s)	HOWARD ANTON, IRL BIVENS and STEPHEN DAVIS
Publisher	JOHN WILEY & SONS, INC.
Year	2012
The edition	10th edition
The reference website	https://arslanhelptyoucom.files.wordpress.com/2016/05/calculus-early-transcendentals-10th-ed-howard-anton-iril-bivens-stephen-davis-ebook.pdf

10. References and additional resources:

1)	James Stewart, Calculus: Early Transcendentals, 7th Edition, Brooks/Cole 2012. Call number in PU library: 515.15 STE
2)	<i>Calculus</i> , EARLY TRANSCENDENTALS, 12th by Thomas
3)	Calculus: Early Transcendentals, 4th Edition, Dennis Zill and Warren S. Wright, Jones and Bartlett Publishers 2011.