



## Course Specifications

<b>Course Title:</b>	MULTI VARIATE CALCULUS
<b>Course Code:</b>	MATH 3320
<b>Program:</b>	BACHELOR OF SCIENCE IN MATHEMATICS
<b>Department:</b>	MATHEMATICS
<b>College:</b>	COLLEGE OF SCIENCE AND HUMANITIES ALKHARJ
<b>Institution:</b>	PRINCE SATTAM BIN ABDUALZIZ UNIVERSITY

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## A. Course Identification

<b>1. Credit hours:</b>	04(4,0,0)
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	Level: 7
<b>4. Pre-requisites for this course (if any):</b>	Math 1060
<b>5. Co-requisites for this course (if any):</b>	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

### 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	48
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	60
	<b>Total</b>	<b>108</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Coordinate Systems – Multivariable Functions – Partial derivatives - Critical Points of Multivariable Functions - Maxima and Minima of the Functions of Two Variables –SP - Lagrange Multipliers – Double Integrals in Rectangular Coordinates – Double Integrals in Polar Coordinates –Triple Integrals in Rectangular and Cylindrical Coordinates – Spherical Coordinates – Centre of Mass - Moment of Inertia - Gradient Fields and Path Independence – Divergence and Curl.

### 2. Course Main Objective

- The main purpose of the course is to make the students understand the concept Multivariable functions – their differentiation (Partial and Total) , Double and triple integrals and their applications.
- Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field). Not at present

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Able to define multivariable functions	K3
1.2	Understand the concept of Partial Derivatives	K4
2	<b>Skills :</b>	
2.1	Evaluate double and triple integrals	S2,
2.2	Determine gradient fields and potential functions	S3

### C. Course Content

No	List of Topics	Contact Hours
1	Multi Variable Functions – Partial Derivatives	3
2	Critical Points – Maxima and Minima of functions of two variables	3
3	Lagrange Multipliers	4
4	Coordinate System – Rectangular – Spherical – Cylindrical Coordinates and conversions from one system to other	4
5	Double Integrals in rectangular coordinates	4
6	Double Integral in Polar Coordinates	4
7	Triple Integral in Rectangular and Cylindrical Coordinates	6
8	Centre of Mass	6
9	Moment of Inertia	6
10	Gradient Fields	4
11	Divergence and Curl	4
<b>Total</b>		<b>48</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge and Understanding</b>		
1.1	Able to define multivariable functions	1. Class Room Lectures 2. Interactive sessions 3.Exclusive Office hours for clearing doubts in small groups	1. Two Internal Exams 2. At least two Quiz 3. End Semester Exam
1.2	Understand the concept of Partial Derivatives		
2.0	<b>Skills</b>		
2.1	Evaluate double and triple integrals	1. Application oriented exercises during tutorial session. 2.Homework to improve the analytical skills	1. Homework 2. Assignments 3. Quiz
2.2	Determine gradient fields and potential functions		

#### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid Term Exam I	6	20%
2	Quiz	4 & 10	5%
3	Mid Term Exam II	13	20%
4	Continuous Assessment – Homework, Assignment,	--	5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
	Attendance etc.		
5	End Semester Exam	15	50%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

1. Exclusive Office Hours – 5 Hours per week
2. Academic Advising for Students – 1 Hour per week

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	-CALCULUS VOLUME II Multivariable Calculus and Linear Algebra, with Applications to Differential Equations and Probability SECOND EDITION, John Wiley & Sons New York London Sydney Toronto, CONSULTING EDITOR George Springer, Indiana University, COPYRIGHT © 1969 BY XEROX CORPORATION. -Advanced Calculus and Analysis MA1002, Ian Craw, April 13, the University of Aberdeen -Thomas G., "Calculus", 11th edition, (2002).
<b>Essential References Materials</b>	NIL
<b>Electronic Materials</b>	NIL
<b>Other Learning Materials</b>	Lecture Notes Prepared by the Department of Mathematics

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with Smart boards with seating facilities for at least 30 students
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Smart board, Internet Connection for Blackboard
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NIL

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of	Quality Assurance Committee	Course Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
course learning outcomes, Effectiveness of Classroom teaching strategies from students through interactions	Senior Faculty Members / HoD	Peer Review
Effectiveness of teaching and assessment	University	End Semester online survey

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

Council / Committee	
Reference No.	
Date	