



## Course Specifications

<b>Course Title:</b>	Calculus 3
<b>Course Code:</b>	2022202-4
<b>Program:</b>	Bachelor in Mathematics.
<b>Department:</b>	Mathematics and Statistics Department
<b>College:</b>	Faculty of sciences
<b>Institution:</b>	Taif university

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## A. Course Identification

<b>1. Credit hours:</b> (4)
<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 checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> 4 <sup>th</sup> level / 2 <sup>nd</sup> year
<b>4. Pre-requisites for this course (if any):</b> Calculus II (2022104-4)
<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	6Hr /Week	100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

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

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

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>This course covers some topics in advanced calculus (real functions of several variables, limits, continuity, partial derivatives and differentials, Jacobian matrix, chain rule, directional derivatives, Gradients Tangent Planes and Normal Vectors, maximum and minimum of Functions of Two Variables, Lagrange multipliers). The course focus also on Double Integrals over Nonrectangular Regions- Double Integrals in Polar Coordinates, Triple Integrals- Triple Integrals in Cylindrical Coordinates and Spherical Coordinates, Change of Variables in Multiple Integrals, Jacobians, Line Integrals- Existence of Anti-derivative, Surface Area and Surface Integrals, Green's Theorem in Vector Form, Divergence Theorem and Stokes's Theorem.</p>
<p><b>2. Course Main Objective</b></p> <p>The student will be taught as follows:</p> <ol style="list-style-type: none"> <li>Introducing real functions of several variables (limits, continuity, partial derivatives, differentials, Jacobian matrix, chain rule) and studying some application of the derivative in problems such as: The Directional derivatives, Gradients Tangent Planes, Normal Vectors, maximum and minimum points and Lagrange multipliers</li> </ol>

2. Describing the double, triple integrals, line integrals and surface integrals to solve applied problems and studying some application of the Calculus in applied problems.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding:</b>	
1.1	Recognize the Limits and Continuity of Functions of Two or More Variables	K1
1.2	Identify the Limits and Continuity of Functions of Two or More Variables.	K1
<b>2</b>	<b>Skills:</b>	
2.1	Explain the limit, continuity, partial derivatives and the total differential for a function of several variables	S1
2.2	Apply performance of different Evaluate double, triple integrals and surface integral.	S1
2.3	Demonstrate the derivative concepts to find tangent lines to level curves and to solve optimization problems.	S1
<b>3</b>	<b>Values:</b>	
3.1	Show the responsibility for their own learning and continuing personal and professional development.	V2

### C. Course Content

No	List of Topics	Contact Hours
1	Functions of Several Variables and Limits.	6
2	Continuity- Partial Derivatives-Differentials- Jacobian matrix.	6
3	The Chain Rule-Directional Derivatives and Gradients Tangent Planes and Normal Vectors.	6
4	Maxima and Minima of Functions of Two Variables-Lagrange Multipliers - Double Integrals and double Integrals over Nonrectangular Regions.	6
5	Double Integrals in Polar Coordinates-Triple Integrals-Triple Integrals in Cylindrical Coordinates.	6
6	<b>Midterm exam,</b> Spherical Coordinates-Triple Integrals in Spherical Coordinates and Change of Variables in Multiple Integrals.	6
7	Jacobians-Line Integrals- Existence of anti-derivative.)	6
8	Surface area and surface integrals.	6
9	Green's Theorem in Vector Form	6
10	Divergence Theorem and Stokes's Theorem	6
<b>Total</b>		<b>60</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	Recognize the Limits and Continuity of Functions of Two or More Variables	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
1.2	Identify the Limits and Continuity of Functions of Two or More Variables.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Assignments</li> </ul>
2.0	<b>Skills:</b>		
2.1	Explain the limit, continuity, partial derivatives and the total differential for a function of several variables	<ul style="list-style-type: none"> <li>Interactive classes</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
2.2	Apply performance of different Evaluate double, triple integrals and surface integral.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> </ul>
2.3	Demonstrate the derivative concepts to find tangent lines to level curves and to solve optimization problems.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Self-learning through the website</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> <li>Assignments</li> </ul>
3.0	<b>Values</b>		
3.1	Show the responsibility for their own learning and continuing personal and professional development.	projects	Oral exams

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes + Home works	Continues	10 %
2	Midterm exam	5 <sup>th</sup> -6 <sup>th</sup>	30 %
3	Class Work (Homework- report- class test....)	8 <sup>th</sup>	10 %
4	Final exam	11 <sup>th</sup>	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:

6 hours per week (as defined in the teaching schedule of the faculty member) for academic advice and consultations.

Teaching staff is also available using Blackboard web site and Taif University “Edugate” System.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>J. Stewart, (2012), Calculus: Early Transcendentals, 7th edition, USA, Brooks/Cole</b>
<b>Essential References Materials</b>	<b>H. Anton, I. Bivens and S. Davis, (2010), Calculus: Early Transcendentals, International Student Version, 10th Edition, USA, John Wiley &amp; Sons, Inc</b>
<b>Electronic Materials</b>	<a href="http://www.math-math.com/">http://www.math-math.com/</a>
<b>Other Learning Materials</b>	-----

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<b>Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students.</b>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Laptop, smart board, and projector.
<b>Other Resources</b> (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	<b>Wi-Fi internet connections</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Peer Reviewer Students	Direct Indirect
Extent of achieving the course learning outcomes	Peer Reviewer Students	Direct Indirect

**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

<b>Council / Committee</b>	Department of Mathematics and Statistics
<b>Reference No.</b>	11
<b>Date</b>	12-7-1443 H

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Mathematics and Statistics  
Department

