



## Course Specifications

<b>Course Title:</b>	<b>Differential Calculus</b>
<b>Course Code:</b>	<b>MATH1050</b>
<b>Program:</b>	<b>Foundation Year Level I</b>
<b>Department:</b>	<b>Mathematics</b>
<b>College:</b>	<b>Science And Humanities</b>
<b>Institution:</b>	<b>Prince Sattam Bin Abdulaziz University</b>

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## A. Course Identification

<b>1. Credit hours:</b>	<b>4 (4,0,0)</b>
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input 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>	<b>- Foundation Year - Level 1</b>
<b>4. Pre-requisites for this course (if any):</b>	<b>NA</b>
<b>5. Co-requisites for this course (if any):</b>	<b>NA</b>

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

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	Weekly 4 hours	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other	Weekly 5 hours	

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

No	Activity	Contact Hours
1	Lecture (12 x 4)	48
2	Laboratory/Studio	
3	Tutorial (14 x 2)	
4	Others (specify) - Office hours 5 hours a week	60
	<b>Total</b>	<b>108</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>This course is directed primarily towards students pursuing a B.Sc. degree in Engineering. Though the contents predominates concepts like real numbers, polynomials, Functions Limits, Derivatives, Differentiation laws, and many others. This course explains these laws of mathematics in the context of engineering sciences in order to make student understand their application in their field of specialization.</p>
<p><b>2. Course Main Objective</b></p> <p>The main objective of this course is to provide students with a strong foundation in mathematical concepts and equip them to take up various courses in Mathematics at various levels of study in the chosen STEM Program of their choice.</p>

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	Be familiar with the basic concepts of mathematics such as real numbers including intervals, functions, limits and continuity, derivatives and its uses	K1
1.2	Have thorough knowledge of differentiation and various techniques of differentiation	K4
2	<b>Skills</b>	
2.1	Be able to apply various techniques of differentiation, reproduce and apply theorems based on derivatives such as Rolle's Theorem, Mean Value Theorem, L'Hospital Rule	S1

### C. Course Content

No	List of Topics	Contact Hours
1	Real Numbers, Polynomials	4
2	Functions, even and odd Functions, Limits and Continuity	4
3	Derivatives – First Principle, Chain Rule, Product Rule, Quotient Rule, Higher Order Derivatives	4
4	Trigonometric Functions and their derivatives, derivatives of Logarithmic and exponential functions	4
5	Hyperbolic and Inverse Hyperbolic functions and their derivatives	8
6	Applications – Related Rates, Tangent and Normal, Rolle's and Mean Value Theorems	4
7	Increasing and Decreasing functions, concavity, Maxima and Minima	8
8	Asymptotes, L Hospital's Rule	8
<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	Be familiar with the basic concepts of mathematics such as real numbers including intervals, functions, limits and continuity, derivatives and its uses	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	Have thorough knowledge of differentiation and various techniques of differentiation		
2.0	<b>Skills</b>		
2.1	Be able to apply various techniques of differentiation, reproduce and apply theorems based on derivatives such as	1. Application oriented exercises during tutorial session.	1. Homework 2. Assignments 3. Quiz

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	Rolle's Theorem, Mean Value Theorem, L'Hospital Rule	2. Homework to improve the analytical skills	4. Mid Term and Final Exam

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid Term Exam I	6	20%
2	Quiz	3,9	5%
3	Mid Term Exam II	12	20%
4	Continuous Assessment – Homework, Assignment, Attendance etc.	--	5%
5	End Semester Exam (50%)	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

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<ul style="list-style-type: none"> <li>• Differential Calculus 1050 for PYP</li> <li>• Lecture Notes Prepared by the Department of Mathematics and displayed in Website / Blackboard of Faculty Member</li> </ul>
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>• -Howard Anton, "CALCULUS EARLY TRANSCENDENTALS", John Wiley &amp; Sons, Last Edition.</li> <li>• -Calculus by Gilbert Strang – MIT, Wellesley-Cambridge press, Box 82-279, WellesleyMA02181</li> <li>• -Tom M. Apostol, CALCULUS VOLUME 1, One-Variable Calculus, with an Introduction to Linear Algebra, SECOND EDITION, John Wiley &amp; Sons, Inc. New York, Santa Barbara, London, Sydney, Toronto, Second Edition Copyright 01967 by John Wiley &amp; Sons, Inc.</li> <li>• -Stewart - Calculus - Early Transcendentals 6e.</li> </ul>
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• Blackboard @psau.edu.sa</li> <li>• YouTube Chanel : Hesham_Math playlist New Mat1050</li> </ul>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>• YouTube Chanel : Hesham_Math playlist New Mat1050</li> </ul>

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with seating facilities for atleast 30 students
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> <li>• Providing classrooms with smart boards and data show</li> <li>• Teaching Resources Room</li> </ul>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N A

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment.	Students	Survey
Extent of achievement of course learning outcomes.	Developmental quality unit	Learning outcomes assessment.
Quality of learning resources Verifying standards of student achievement.	Developmental quality unit	Learning outcomes assessment.
Effectiveness of teaching.	Students	Survey
Extent of achievement of course learning outcomes.	Independent member teaching staff	Check marking by an independent member teaching staff of samples of student work.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

**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>	
<b>Reference No.</b>	
<b>Date</b>	