University of Asia Pacific (UAP)

Department of Computer Science and Engineering (CSE)

BSc in CSE Program

Course Outline – Course Name

Part A – Introduction

1. **Course No. / Course Code:** MTH 101
2. **Course Title:** Math-I: Calculus I
3. **Course Type:** Theory
4. **Level/Term and Section:** First year first semester
5. **Academic Session:** Fall 2024
6. **Course Instructor: Mst. Mariam Sultana**
7. **Pre-requisite (If any): None**
8. **Credit Value: 3.00**
9. **Contact Hours: 3.00**
10. **Total Marks: 100**
11. **Course Objectives and Course Summary:**

- Define the limit, continuity and differentiability of functions, identify the rate of change of a function with respect to independent variables and describe the different techniques of evaluating indefinite and definite integrals.
- Apply the concepts or techniques of differentiation and integration to solve the problems related to engineering study.
- Calculate the length, area, volume, center of gravity and average value related to engineering study.

12. **Course Learning Outcomes: at the end of the Course, the Student will be able to –**

CLO 1	Define the limit, continuity and differentiability of functions, identify the rate of change of a function with respect to independent variables.

CLO 2	Describe the different techniques of evaluating indefinite and definite integrals.
CLO 3	Apply the concepts or techniques of differentiation and integration to solve the problems related to engineering study.
CLO 4	Use of Gamma and Beta functions to evaluate integrals.
CLO 5	Calculate the length, area, volume, center of gravity and average value related to engineering study.

13. Mapping / Alignment of CLOs with Program Learning Outcomes (PLO) (Optional):

CLO No.	Corresponding PLOs (Appendix-1)	Bloom's taxonomy domain/level (Appendix-2)	Delivery methods and activities	Assessment Tools
CLO1	PLO1	Define	Lecture, Problem Solving	Class Test, Mid-term
CLO2	PLO1	Describe	Lecture, Problem Solving	Class Test, Mid-term
CLO3	PLO1	Calculate	Face to Face Learning (lecture)	Class Test, Mid-term
CLO4	PLO2	Evaluate	Problem Solving	Class Test, Assignment, Final Exam
CLO5	PLO2	Apply	Multimedia	Class Test, Assignment, Final Exam

Part B – Content of the Course

14. Course Content: **Functions:** Graphing Functions, Mathematical Models and Commonly used Functions (Linear, Polynomial, Power), Mathematical Models and Commonly Used Functions (Algebraic, Trigonometric, Exponential, and Logarithmic Functions), Transformations (Scaling, Reflection, Composition), Inverse of Functions, Growth of Functions. **Limits:** Concepts, One Sided Limits, Infinite limits, Limit Laws, Sandwich Theorem, Formal Definition of Limits and Continuity of Functions, Intermediate Value Theorem and Its Application, Limits at Infinity and the Horizontal Asymptotes. **Derivatives:** Derivatives and Rate of Change, Derivatives as Functions, Differentiability of Functions, Rules and Techniques of Differentiation. **Applications of Differentiation:** Rates of Change in Natural and Social Sciences, Exponential Growth and Decay, Linear Approximation and Differentials, Finding Minimum and Maximum Value of Functions and the first and Second Derivative Tests, Indeterminate Forms and L'Hospital's Rule, Curve Sketching. **Integrals:** Riemann Sum and Definite Integrals, Properties of Integrals, Fundamental Theorem of Calculus, Anti-Derivative and Indefinite Integral, Net Change Theorem, Substitution Rule. **Application of Integration:** Finding Area between Curves, Volumes, Volumes by Cylindrical Shells, Average Value of a Function,Mean Value Theorem for Integrals.

15. Alignment of topics of the courses with CLOs:

SL. No	Topics / Content	Course Learning Outcome (CLO)
1	Function and sketching of a function	**CLO1**
2	Limit, continuity and differentiability	**CLO2**
3	Definite and indefinite integral, Gamma and Beta functions	**CLO3**
4	Applied problems related to integration (Length, area, volume)	**CLO4**

16. Class Schedule/Lesson Plan/Weekly plan:

Topics	**Specific Outcome(s)**	**Time Frame**	**Suggested Activities**	**Teaching Strategy(s)**	**Alignment with CLO**
Function, Limit Continuity		Week 1		Multimedia or, Lecture	**CLO1**
Differentiability, Successive differentiation		Week 2		Multimedia or, Lecture	**CLO1**
Mean Value theorem, Taylor theorem		Week 3		Multimedia or, Lecture	**CLO2**
Partial Differentiiation		Week 4		Multimedia or, Lecture	**CLO2**
Maxima and minima of functions		Week 5		Multimedia or, Lecture	**CLO2**
MID-TERM EXAMINATION		Week 6			
Tangent and Normal		Week 7		Multimedia or, Lecture	**CLO2**
Method of substitution		Week 8		Multimedia or, Lecture	**CLO2**
Techniques of integration		Week 9		Multimedia or, Lecture	**CLO3**
Definite integration, Reduction formula		Week 10		Multimedia or, Lecture	**CLO3**
Gamma and Beta function		Week 11		Multimedia or, Lecture	**CLO3**

Area , Volume problems		Week 12		Multimedia or, Lecture	**CLO4**
Area , Volume problems in polar co-ordinates		Week 13		Multimedia or, Lecture	**CLO4**
Multiple integrals		Week 14		Multimedia or, Lecture	**CLO4**
FINAL EXAMINATION		Week 15			

17. **Teaching-Learning Strategies:** Face to Face Learning (lecture), Guided Learning, Independent Learning, Assessment
18. **Assessment Techniques of each topic of the course:** Class Test, Assignment, Mid-Term Exam, Final Exam

Part C – Assessment and Evaluation

19. **Assessment Strategy**

Class Tests: Altogether 4 class tests may be taken during the semester,2 class tests will be taken for midterm and 2 class tests will be taken for final term. Out of these 2 class tests for each term best I class tests will be counted. No makeup class tests will be taken. Students are strongly recommended not to miss any class tests.

Assignment: The students will have to form a group of maximum 4 members. The topic or case studies will be given as assignment in groups during the class which they have to prepare at home and will submit on or before the due date. No late submission of assignments will be accepted. Students will have to do the presentation on the given topic as assignment

CIE- Continuous Internal Evaluation (30 Marks)

Bloom's Category Marks (out of 30)	**Tests (15)**	**Assignments (5)**	**Quizzes (5)**	**External Participation in Curricular/Co-Curricular Activities (5)**
Remember			**3**	
Understand	**2**		**2**	
Apply	**3**	**5**		
Analyze	**5**			
Evaluate	**5**			
Create				**5**

SMEB- Semester Mid & End Exanimation (70 Marks)

Bloom's Category	Test
Remember	5
Understand	10
Apply	15
Analyze	15
Evaluate	15
Create	10

20. Evaluation Policy

Grades will be calculated as per the university grading structure and individual student will be evaluated based on the following criteria with respective weights.

1. Class Tests 30%
2. Term Examination 50%
3. Mid-Term Examination 20%

UAP Grading Policy

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

Part D – Learning Resources

21. Text Book

1. Howard Anton, Irl C. Bivens, Stephen Davis, Calculus, 10th Edition.

Reference Books & Materials

2. Morris Kline, Calculus: An Intuitive and Physical Approach, 2nd Edition.
3. Schaum's Outline of Calculus, Seventh Edition.
4. Calculus, James Stewart, 7th edition