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 103
2. **Course Title:** Math-II: Calculus II
3. **Course Type:** Theoretical
4. **Level/Term and Section: 1st year 2nd term**
5. **Academic Session:** Spring 2024
6. **Course Instructor:**
7. **Pre-requisite (If any):**
8. **Credit Value:** 3.0
9. **Contact Hours: 3.00**
10. **Total Marks:** 100
11. **Course Objectives and Course Summary:**

    Use of advanced level calculus in the application-oriented fields of computing, engineering and many more. It also provides important tools in understanding Differential Equations, Parametric Equations and Polar Coordinates, Sequence and Partial Derivatives, Multiple Integral etc.

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

CLO 1	**Identify** differential equations in different forms.
CLO 2	**Compute** polar coordinates in various curves
CLO 3	**Apply** different solution methods to solve multivariable problems

CLO 4	**Analyze** different calculus theorems
CLO 5	**Application** of Different calculus theorem in real life problem

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	Identify	Multimedia or Lecture	Tests, Assignments, Quizzes and External Participation in Curricular/Co-Curricular Activities
CLO2	PLO1	Compute	Multimedia or Lecture	Tests, Assignments, Quizzes and External Participation in Curricular/Co-Curricular Activities
CLO3	PLO1	Apply	Multimedia or Lecture	Tests, Assignments, Quizzes and External Participation in Curricular/Co-Curricular Activities
CLO4	PLO2	Analyze	Multimedia or Lecture	Tests, Assignments, Quizzes and External Participation in Curricular/Co-Curricular Activities
CLO5	PLO2	Application	Multimedia or Lecture	Tests, Assignments, Quizzes and External Participation in Curricular/Co-Curricular Activities

Part B – Content of the Course

14. Course Content:

Differential Equations: Modeling with Differential Equations, Solving First Order Differential Equations, Direction Fields and Euler's Method, Methods for Separable Equations and Linear Equations. **Parametric Equations and Polar Coordinates:** Curves Defined by Parametric Equations, Calculus with Parametric Curves, Polar Coordinates, Area and Length in Polar Coordinates, Conic Sections in Polar Coordinates. **Sequence and Partial Derivatives:** Functions of multiple variables, Limits and Continuity, Tangent and linear approximations, chain rule, directional derivatives, Max-Min values, Lagrange Multiplier, Derivatives with vectors and matrices, **Multiple**

Integral: Change of variables in multiple integral, applications, **Vector Calculus:** Vector fields, line integrals, Green's theorem, Curl and divergence, parametric surfaces, Stroke's theorem, Divergence theorem.

15. Alignment of topics of the courses with CLOs:

SL. No	Topics / Content	Course Learning Outcome (CLO)
1	Identify differential equations in different forms.	**CLO1**
2	Compute polar coordinates in various curves	**CLO2**
3	Apply different solution methods to solve multivariable problems	**CLO3**
4	Analyze different calculus theorems	**CLO4**
5	Application of Different calculus theorem in real life problem	**CLO5**

16. Class Schedule/Lesson Plan/Weekly plan:

Topics	**Specific Outcome(s)**	**Time Frame**	**Suggested Activities**	**Teaching Strategy(s)**	**Alignment with CLO**
Differential Equations: Modeling with Differential Equations, Solving First Order Differential Equations		Week 1 3 hours		Multimedia or Lecture	CLO1
Direction Fields and Euler's Method, Methods for Separable Equations and Linear Equations.		Week 2 3 hours		Multimedia or Lecture	CLO1
Parametric Equations and Polar Coordinates: Curves Defined by Parametric		Week 3 3 hours		Multimedia or Lecture	CLO2

Equations, Calculus with Parametric Curves,					
Polar Coordinates, Area and Length in Polar Coordinates,		Week 4 3 hours		Multimedia or Lecture	CLO2
Conic Sections in Polar Coordinates.		Week 5 3 hours		Multimedia or Lecture	CLO2
MID-TERM EXAMINATION		Week 6 3 hours			
Sequence and Partial Derivatives: Functions of multiple variables, Limits		Week 7 3 hours		Multimedia or Lecture	CLO3
Continuity, Tangent and linear approximations, chain rule, directional derivatives		Week 8 3 hours		Multimedia or Lecture	CLO3
Max-Min values, Lagrange Multiplier, Derivatives with vectors and matrices		Week 9 3 hours		Multimedia or Lecture	CLO3
Multiple Integral: Change of variables in multiple integral, applications		Week 10 3 hours		Multimedia or Lecture	CLO3, CLO5
Vector Calculus: Vector fields, line integrals, Green's theorem		Week 11 3 hours		Multimedia or Lecture	CLO4, CLO5
Curl and divergence, parametric surfaces		Week 12 3 hours		Multimedia or Lecture	CLO4, CLO5
Stroke's theorem, Divergence		Week 13 3 hours		Multimedia or Lecture	CLO4, CLO5

theorem					
Revision class		Week 14 3 hours			
FINAL EXAMINATION		Week 15 3 hours			

17. Teaching-Learning Strategies:

18. Assessment Techniques of each topic of the course:

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 50)	**Tests (15)**	**Assignments (5)**	**Quizzes (5)**	**External Participation in Curricular/Co-Curricular Activities (5)**
Remember	**1**		**5**	
Understand	**3**	**1**		
Apply	**2**	**2**		
Analyze	**4**	**1**		
Evaluate	**3**			
Create	**2**	**1**		**5**

SMEB- Semester Mid & End Exanimation (70 Marks)

Bloom's Category	**Test**
Remember	**10**
Understand	**15**

Apply	**10**
Analyze	**15**
Evaluate	**10**
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. B. C. Das and B. N. Mukherjee, Differential Calculus.
2. B. C. Das and B. N. Mukherjee, Integral Calculus.
3. James Stewart, Multivariable Calculus, Cengage Learning.

Reference Books & Materials

4. Edwards, Henry C., and David E. Penney. Multivariable Calculus, Prentice Hall