University of Asia Pacific (UAP)
Department of Basic Sciences and Humanities

Course Outline

Program:	Computer Science and Engineering (CSE)
Course Title:	Mathematics I
Course Code:	MTH 101
Semester:	Spring-2020
Level:	1st year, 1st semester
Credit Hour:	3.0
Name & Designation of Teacher:	Mahruna Kader, Lecturer, Department of BS&H.
Office/Room:	Department of BS&H., 2nd floor, UAP City Campus
Class Hours:	**Section A**: Monday: 9:30 am - 10:50 am Wednesday: 12:30 pm - 1:50 pm **Section B**: Monday: 11:00 am - 12:20pm Wednesday: 9:30 am - 10:50 am
Consultation Hours:	**Tuesday:** 3:30pm - 5.00pm & **Thursday:** 3:30pm - 5.00pm
E-mail:	mkader@uap-bd.edu
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Rationale:	Use of Calculus is widespread in science, engineering, business and many other fields. Calculus is a tool used almost everywhere in the modern world to describe change and motion. It also provides important tools in understanding functions and has led to the development of new areas of mathematics including real and complex analysis and geometry.
Pre-requisite (if any)**:**	None
Course Synopsis:	**Three Dimensional Geometry:** (3D): Co-ordinates in three dimensions, direction cosines and direction ratios, plane, straight lines, spheres.

Differential Calculus: Function, domain and range of a function, graphs of simple functions (exponential, logarithmic and trigonometric), Limit Continuity and Differentiability, Leibnitz's theorem, Taylor's and Maclaurin's theorems in finite and infinite forms. Expansion of function by differentiation and integration. Evaluation of indeterminate forms by L'Hospitals rule, Partial differentiation, Tangent and normal, Determination of maximum and minimum values of functions and point of inflection, Applications. Curvature: radius, circle, centre and chord of curvature.

Integral Calculus: Integration by the method of substitution, Standard integrals. Integration by successive reduction, Definite integral, Walli's formulae. Improper integrals, Beta function and Gamma function. Area under a plane curve and area of a region enclosed by two curves in Cartesian and polar co-ordinates. Jacobian, Multiple integrals with applications.

Vector : Dot product, Cross Product, Box Product, Projection.

Course Objectives:

The objectives of this course are to:

1. Draw the graphs of functions by determining its properties like extrema, concavity and increasing/decreasing properties using differential calculus.
2. Evaluate the slope of a function expressed implicitly as well as implicitly.
3. Expand a function in Taylor's / Maclaurin series.
4. Evaluate improper and multiple integrals.

Course Outcomes (CO) and their mapping with Program outcomes (PO) and Teaching-Learning Assessment methods:

CO No.	CO Statements: Upon successful completion of the course, students should be able to:	Corresponding POs (Appendix-1)	Bloom's taxonomy domain/level (Appendix-2)	Delivery methods and activities	Assessment Tools
CO1	Explain what is implicit and explicit function and differentiate functions expressed implicitly. Also can solve problems relating to rate of changes, limit of indeterminate	1	1	Lecture, multimedia.	Quiz, Written exam

	form by L' Hospital's rule.				
CO2	Determine the increasing & decreasing property, concavity and extrema of a function and Interpret the Rolle's Theorem and Mean Value Theorem and understand. Also be able to find Taylor and Maclaurin's series expansion of a function. Also understand the concept of partial differentiation.	2	1	Lecture, multimedia, Problem Solving.	Quiz, Written exam
CO3	Evaluate both definite and indefinite integrals by using various well known methods such as method of substitution integration by parts, partial fractions. Also compute the area, arc length and volume of solids of revolution bounded by different curves.	4	2	Lecture, Problem Solving, Group discussion	Quiz, Assignment.
CO4	Evaluate improper integrals including integrals over infinite intervals and use Gamma and Beta functions to evaluate integrals.	5	2	Lecture, multimedia, Problem Solving.	Quiz, Written exam
CO5	Understand and apply Three Dimensional Geometry and Vector.	8	1	Lecture, multimedia, Problem Solving.	Assignment, Written exam,

Weighting COs with Assessment methods:

Assessment Type	% weight	CO1	CO2	CO3	CO4	CO5
Final Exam	**50%**	10	10	10	10	10
Mid Term	**20%**	5	10	5		

Class performance, Quizzes, Presentation, case study, open book exam, Assignment, Project, reports on field trip/workshop attended Others.	**30%**			10	15	5
Total	**100%**	15	20	25	25	15

Grading Policy: As per the approved grading policy of UAP (Appendix-3)

Course Content Outline and mapping with COs

Weeks	Topics / Content	Course Outcome	Delivery methods and activities	Reading Materials
1	Function, domain and range of a function, graphs of simple functions (exponential, logarithmic and trigonometric)	CO1	Lecture, multimedia	Calculus by H. Anton, Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee
2	Limit Continuity and Differentiability, Leibnitz's theorem, Taylor's and Maclaurin's theorems in finite and infinite forms.	CO2	Lecture, Problem Solving, Group discussion	Calculus by H. Anton, Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee
3	Leibnitz's theorem. Rolle's theorem. Mean value theorem	CO2	Lecture, Multimedia, Problem Solving, Group discussion	Calculus by H. Anton
4	Basic Differentiation, Evaluation of indeterminate forms by L'Hospitals rule.	CO2	Lecture, multimedia, problem solving	Calculus by H. Anton
Quiz 1				
5	Partial differentiation, Euler's Theorem.	CO2	Lecture, multimedia, problem solving	Calculus by H. Anton, Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee
6	Determination of maximum and minimum values of functions and point of	CO2	Lecture, multimedia, problem solving	Calculus by H. Anton, Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee

	inflection. Applications.			
7	Three Dimensional Geometry.	CO5	Lecture, multimedia, problem solving	
Quiz 2				
MIDTERM EXAM				
8	Integration by the method of substitution. Standard integrals.	CO3	Lecture, multimedia, problem solving	Calculus by H. Anton
9	Integration by successive reduction. Definite integrals, its properties and use in summing series.	CO3	Lecture, multimedia, problem solving	Calculus by H. Anton, Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee
10	Walli's formulae. Improper integrals.	CO4	Lecture, multimedia, problem solving	Calculus by H. Anton, Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee
11	Beta function and Gamma function.	CO4	Lecture, multimedia, problem solving	Calculus by H. Anton
Quiz 3				
12	Jacobians, Multiple integrals with applications.	CO4	Lecture, multimedia, problem solving	Calculus by H. Anton
13	Vector Dot product, Cross Product, Box Product, Projection.	CO5	Lecture, multimedia, problem solving	Calculus by H. Anton
Quiz 4				
14	Review of Final Exam Syllabus			
FINAL EXAM				

Required Reference(s): Calculus by H. Anton

Recommended Reference(s): Differential Calculus & Integral Calculus by B.C. Das & B.N. Mukherjee

Special Instructions:

- 70% class attendance is mandatory for a student in order to appear at the final examination.
- Students must come to the class prepared for the course material covered in the previous class (es).
- They must submit their assignments on time.
- They must be aware of the *Plagiarism Polici*es spelt out in the curriculum.

- No late or partial assignments will be acceptable. There will be no make-up quizzes.

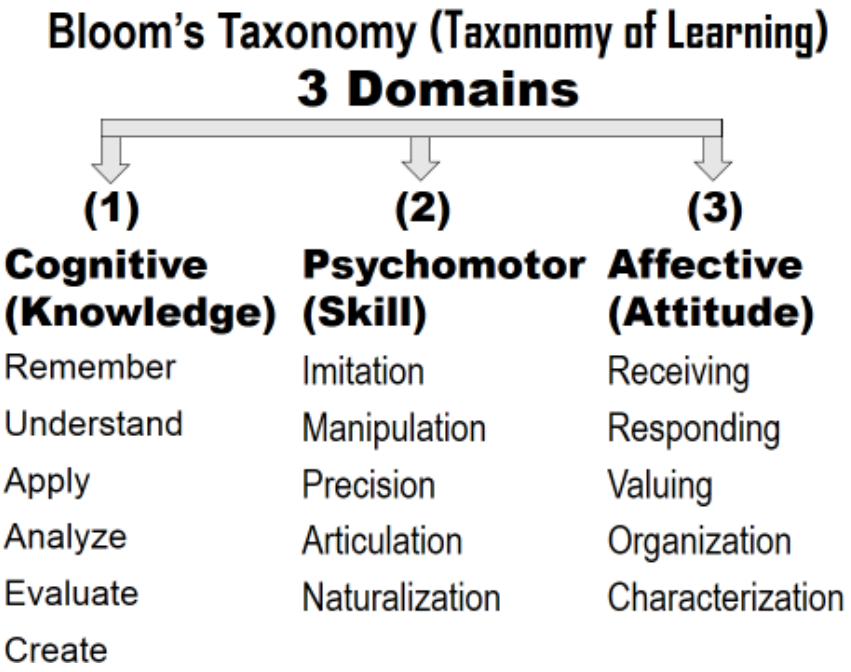
Prepared by	Checked by	Approved by
Mahruna Kader Lecturer, Department of BS&H	Chairman, PSAC committee	Head of the Department

Appendix-1:

Washington Accord Program Outcomes (PO) for engineering programs:

No.	PO	Differentiating Characteristic
1	Engineering Knowledge	Breadth and depth of education and type of knowledge, both theoretical and practical
2	Problem Analysis	Complexity of analysis
3	Design/ development of solutions	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified
4	Investigation	Breadth and depth of investigation and experimentation
5	Modern Tool Usage	Level of understanding of the appropriateness of the tool
6	The Engineer and Society	Level of knowledge and responsibility
7	Environment and Sustainability	Type of solutions.
8	Ethics	Understanding and level of practice
9	Individual and Team work	Role in and diversity of team
10	Communication	Level of communication according to type of activities performed
11	Project Management and Finance	Level of management required for differing types of activity
12	Lifelong learning	Preparation for and depth of Continuing learning.

Appendix-2



Appendix-3

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