ULAB — UNIVERSITY OF LIBERAL ARTS BANGLADESH

Course Outline

Basic Information

Faculty	Satyaki Das, (Room: PC-315)
Office Hour	**Sunday:**11:00am – 11:30 am& 01:30 pm – 2:30 pm (Room: PC-315) **Tuesday:**11:00 am – 11:30 am & 01:30 pm – 2:30 pm (Room: PC-315) **Monday:** 11:30 am – 12:30 pm (Room: A-514) **Wednesday:** 11:30 am – 12:30 pm (Room: A-514) **Thursday:**9:30 am – 12:30 pm (Room: PC-315) Note: Also available by Email Appointment at other times **satyaki.das@ulab.edu.bd**
Contact Details	satyaki.das@ulab.edu.bd
Course Pre-requisites	N/A
Department offering the course	Computer Science and Engineering(CSE)
Course Title	Differential and Integral Calculus

Course Code	MAT 101		Sec	04	Credit	03	Term			Fall 2019
Number of Lectures	24	Number of Tutorials			Number of Practical				Total	24

Course Details

1. Course Description

This course contains Differential Calculus and Integral Calculus which are very important topics for the Engineering students and for the students of Science and Technology. This is a basic course of Mathematics. In this course, students will learn about Function, Limit and Continuity of a Function, Differentiability of a function. From this they will able to know how to find the rate of change, the maxima and minima of functions, which have a wide application in different fields of Science and Technology. Then they will study Integral Calculus and their applications in the various fields of life.

2. Course Objective

1. To **provide** a thorough understanding the meaning of differentiation and Integration with real-life applications and the resource requirements.
2. To **introduce** the various methods of calculating derivative of a function.
3. To **enable** students to apply the techniques of indefinite and definite integration to calculate areas, volumes, and lengths.
4. To **emphasize** on efficient for solving practical problems through various formulae to be used in the implementations of technical problems.
5. To **expose** the students to a variety of techniques that have practical applications, while conducting detailed analysis of the requirements.

3. Intended learning outcomes of the course (ILOs)

KNOWLEDGE	1.	**Describe** the objective of Differential and Integral Calculus.
	2.	**Explain** terms related to various techniques of differentiation and integration, design mathematical modeling of different applications.
SKILLS	3.	**Understand** a practical problem; **apply** techniques and appropriate formulation to implement method to solve the problem.
	4.	**Analyze** performance and resource requirements of various calculations.
ATTITUDE	5.	**Design and develop** solutions to real-life problems.

4. Mapping of Course LO and PLO:

Learning Outcome (LO) of the Course	Program Learning Outcome (PLO)											
	1	2	3	4	5	6	7	8	9	10	11	12
ILO 1	MJ			MN								
ILO 2	MJ	MJ										
ILO 3	MJ	MJ	MJ	MN	MN							
ILO 4		MJ		MJ								
ILO 5		MJ	MJ	MJ	MN	MN						

5. Contents

SL. NO.	ILO	Topic	Teaching Strategy	Assessment Strategy	Number of Sessions
1	1-3, 5	Differential Calculus: Functional Analysis and Graphical Information: function, properties of functions, graphs of functions, new function from old, lines and family of functions, Limit: Limits (an informal view), one sided limits, the relation between one sided and two sided limits, computing limits, Continuity: continuity and discontinuity, some properties of continuity, the intermediated value theorem.	Lecture Exercise	Q/A Test	6
2	3, 5	Derivatives: slop and rate of change, tangent and	Lecture	Q/A	3

		normal, derivative of a function, physical meaning of derivative of a function, techniques of differentiation, chain rule, successive derivatives.	Exercise	Test	
3	1-5	Derivative in graphing and applications: analysis of functions, maximum and minimum, Expansion of functions: Taylor's series, Maclaurian's series, Leibniz; Rolle's and Mean Value theorems, Partials and total derivatives of a function of two or three variables.	Lecture Exercise	Q/A Test	3
4	1-5	Different technique of integration: integration, fundamental integrals, methods of substitutions, integration of rational functions, integration by parts, integrals of special trigonometric functions, reduction formulae for trigonometric functions.	Lecture	Q/A Test	6
5	3,5	Definite integrals: general properties of definite integral, definite integral as the limit of sum and as an area, definition of Riemann integral, Fundamental theorem of integral calculus and its applications to definite integrals, determination of arc length, Improper integrals, Double integrals, Evaluation of Areas and Volumes. Introduction to MATLAB and LAB Sessions	Lecture Exercise	Q/A Test	6
				Total	24

6. A. Assessment Schedule

Assessment 1	Quiz	Session	Week 5 & Week 11
Assessment 2	Assignment	Session	Week 5, 7 & Week 10
Assessment 3	Mid-term Examination	Session	As per ULAB schedule
Assessment 4	Final Term Examination	Session	As per ULAB schedule

B. Weights of Assessments

Assessments	%
Mid-term Examination	20

Final Term Examination	50
Attendance and class performance	10
Assignments	10
Quizzes	10
Total	**100**

C. Grading Policy

Policy	Letter Grade	Grade Point	Assessments
95% and above	A+	4.00	Outstanding
85% to below 94%	A	4.00	Superlative
80% to below 84%	A-	3.80	Excellent
75% to below 79%	B+	3.30	Very Good
70% to below 74%	B	3.00	Good
65% to below 69%	B-	2.80	Average
60% to below 64%	C+	2.50	Below Average
55% to below 59%	C	2.20	Passing
50% to below 54%	D	1.50	Probationary
below 50%	F	0.00	Fail
--	I	0.00	Incomplete
--	W	0.00	Withdrawn
--	AW	0.00	Administrative Withdrawal

7. List of References

Course Notes	Please be regular in the lectures and check the ULAB moodle repository and the facebook group page to access course notes.
Essential Books (Text Books)	1. Calculus by Howard Anton 2. Calculus – An Applied Approach by Ron Larson, Eight Edition 3. Engineering Mathematics by John Bird
Recommended Reference Books	1. Calculus by Thomas Finney 2. Differential Calculus by Das & Mukherjee 3. Integral Calculus by Das & Mukherjee
Periodicals	N/A
Online Resources	https://www.intmath.com

Facilities Required for Teaching and Learning

Multimedia Projector, Whiteboard, Internet access from classroom computer, Audio/Visual equipments.\

Course Policies and Procedures

1. **Class attendance:** Regular attendances of classes are mandatory and students will be assigned F automatically if he/she misses 6 consecutive classes with no proper reason.
2. **Late submission of work:** Late submission will be followed by penalty, please maintain deadlines.
3. **Unfair means /plagiarism:** Plagiarism is a form of cheating so will not be accepted. Original work is encouraged as they will carry value marks.

Appendix-1: Program Learning Outcome (PLO)

No.	PLO
1.	**Engineering Knowledge**
2.	**Problem Analysis**
3.	**Design/Development of Solutions**
4.	**Investigation**
5.	**Modern Tool Usage**
6.	**The Engineer and Society**
7.	**Environment and Sustainability**
8.	**Ethics**
9.	**Communication**
10.	**Individual and Team Work**
11.	**Life Long Learning**
12.	**Project Management and Finance**

Generic Skills (Detailed):

1. **Engineering Knowledge (T)** -Apply knowledge of mathematics, sciences, engineering fundamentals and manufacturing engineering to the solution of complex engineering problems;
2. **Problem Analysis (T)** – Identify, formulate, research relevant literature and analyze complex engineering problems, and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;
3. **Design/Development of Solutions (A)** –Design solutions, exhibiting innovativeness, for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.
4. **Investigation (D)** Conduct investigation into complex problems, displaying creativeness, using research-based knowledge, and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;
5. **Modern Tool Usage (A & D)** -Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations;
6. **The Engineer and Society (ESSE)** -Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices.
7. **Environment and Sustainability (ESSE)** -Understand the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;
8. **Ethics (ESSE)** –Apply professional ethics with Islamic values and commit to responsibilities and norms of professional engineering code of practices.
9. **Communication (S)** -Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

10. **Individual and Team Work (S)** -Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
11. **Life Long Learning (S)** -Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
12. **Project Management and Finance (S)** -Demonstrate knowledge and understanding of engineering management and financial principles and apply these to one's own work, as a member and/or leader in a team, to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship.

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Course Coordinator/ Teacher   *Head of the Department*

Date: Date: