SIR SYED UNIVERSITY OF ENGINEERING & TECHNOLOGY
SOFTWARE ENGINEERING DEPARTMENT

COURSE INFORMATION SHEET

Session:	Spring 2024
Course Title:	Calculus & Analytical Geometry
Course Code:	MS-103
Credit Hours:	3
Semester:	2nd
Pre-Requisites:	None
Instructor Name:	Dr. Nida Ahmed
Email and Contact Information:	nida.jamil@ssuet.edu.pk
WhatsApp Group	MS 203-FALL-2024 Sec E
Office Hours:	8:30 am-5:30 pm
Mode of Teaching:	Synchronous

COURSE OBJECTIVE:

This course introduces fundamental concepts in Calculus and analytical geometry to the engineering students. In this course we will cover the calculus of real valued functions. The objectives of this course are Motivate students to develop their intuition on analyzing functions and interpreting results, rather than just focus on mathematical formulation. Use both the definition of derivative as a limit and the rules of differentiation to differentiate functions.

COURSE OUTLINE:

Functions & Graphs: Basic concepts of functions, types, graph, shifting of graphs. Limits: Left-hand and right-hand limits, Infinite limits, conditions of continuity. Derivatives: Derivatives and their rules, Implicit differentiation, evaluation of limits using L' Hopital's rule, Rolle's theorem, Mean value theorem, maxima and minima of functions of single, Curve sketching, asymptotes, tangent and normal, Higher order derivatives, Leibnitz theorem, Taylor's and McLaurin's series, Limits and continuity, partial derivatives and chain rule, Maxima/minima of function of two variables. Integrations: Indefinite integrals, Riemann sums and definite integrals, Fundamental theorems of integral calculus, Integration by substitution, by parts, by partial fraction and by trigonometric substitution, double integrals, change of order, conversion to polar form, Application in finding area and volume. Vector Algebra: Review of vector algebra, vector product of three and four vectors, volume of parallelepiped and tetrahedron, Parametric equations, Polar coordinates, rectangular coordinates system in three dimensions, Direction cosines, Equations of straight line, Plane.

COURSE LEARNING OUTCOMES (CLOs) and its mapping with Program Learning Outcomes (PLOs):

CLO No.	Course Learning Outcomes (CLOs)	PLOs	Bloom's Taxonomy
1	**Demonstrate** the basic concepts of calculus and their need in engineering.	PLO-1 (Academic Education ()	C2 (Understanding)
2	**Apply** Differential and partial Calculus to interpret different engineering problems.	PLO-1 (Academic Education))	C3 (Applying)
3	**Analyze** the concepts of vector algebra, analytical geometry, and Integration in engineering problems.	PLO-1 (Academic Education)	C4 (Analyzing)

COMPLEX ENGINEERING PROBLEM:

Complex Engineering Problem Details	**Included: NO**

RELATIONSHIP BETWEEN ASSESSMENT TOOLS AND CLOs:

Assessment Tools	CLO-1 (26 Marks)	CLO-2 (41 Marks)	CLO-3 (33 Marks)	Total (100)
Quizzes	9.5% (03)	07% (03)	14% (04)	10
Assignments	9.5% (03)	07% (03)	14% (04)	10
Midterm Exam	48% (15)	36.5% (15)	------	30
Final Exam	33% (05)	49.5% (20)	72% (25)	50

GRADING POLICY:

Assessment Tools	Percentage
Quizzes	10%
Assignments	10%
Midterm Exam	30%
Final Exam	50%
TOTAL	**100%**

RECOMMENDED TEXT BOOK:

- Maurice D. Weir, Joel Hass, Frank R. Giordano, ***Thomas' Calculus***, 14th edition, Pearson Prentice Hall., (2017). ISBN 13: 978-0-13-443898-6, ISBN 10: 0-13-443898-1
  URL:https://www.engbookspdf.net/thomas-calculus-14th-edition-pdf/

REFERENCE BOOKS:

- Anton, Bivens, Davis, ***Calculus,*** 11th edition, John Willey & Sons, Inc., (2016). ISBN-13: 978-8126556403, ISBN-10: 9788126556403
- Earl William Swokoski, ***Calculus***, 5th edition, PWS-KENT Pub. Co., (1991). ISBN 13: 978-0534926489, ISBN 10 0534435386
- Morris Kline, ***Calculus: An Intuitive and Physical Approach***, 2nd edition, Dover Publications, (2013). ISNB 13: 978-0486404530, ISNB 10: 9780486404530

LESSON PLAN

Course Title: Calculus & Analytical Geometry
Course Code: MS-103

Week No.	Week Dates	Topics	Required Reading	
1	14-10-2024	Functions: Basic concepts, types of functions, Domain and range of function. Symmetries of functions(even odd function)	**T.B:** 1.1 Page 11-12 Q1-8 Q15-20 Q47-62	CLO :1 PLO-1
2	15-10-2024	graphs of some standard functions Shifting of graphs	**T.B:** 1.1 Page 11-12 Q15-20 Q47-62	CLO :1 PLO-1
3	21-10-2024	Composite functions and Application	T.B: 1.2 Page 18 Q1-21 Q23-30	CLO :1 PLO-1 **Quiz 01**
4	22-10-2024	Existence and estimating of limits, Finding limits graphically	**T.B:** 2.2 Page 53-54 Q1-6, Q11-22 2.4 Page 70-71 Q1-4 Q11-12	CLO :1 PLO-1 **Assignment1**
5	23-10-2024	Finding limit and graphically Continuity, continuity test	2.5 Page 81-82 Q1-10 Q13,14 Q29,30	CLO :1 PLO-1
6	29-10-2024	Differentiability of functions of single variable	**T.B:** 3.2 Page 111 Q7-12	CLO :2 PLO-1
7	30-10-2024	Derivatives and theirrules Higher order derivatives.	3.3 Page 121 Q1-20 Page 127 Ex 3 and Ex 5	CLO :2 PLO-1
8	7-11-2024	Implicit differentiation Equations of tangent and normal	3.4 Page 130 Q7,8,13,23 Ex 3.5 Q1-10 Ex 3.6 Q1-8	CLO :2 PLO-1 **Quiz 2**

9	8-09-2024	Derivatives of trigonometric functions,	**T.B:** 3.7 Page 151-152 Q1-Q5 Q31-38 Q 43	CLO :2 PLO-1
10	9-09-2024	Maxima and minima of functions of single variable and curve sketching First and second order derivatives tests	**T.B:** 4.4 Page210-212 Q1-Q2	CLO :2 PLO-1
11	10-09-2024	Maxima and minima of functions ofsingle variable and curve sketching First and second order derivatives tests	**T.B:** 4.4 Page210-212 Q3-Q4	CLO :2 PLO-1
12	16-09-2024	Finding limits using L'Hopital rule	**T.B:** 7.5 Page 414 Q7-Q30	CLO :2 PLO-1 **Assignment 02**
13	17-09-2024	Chain rule, and their applications	**T.B:** 4.2 Page 195 Q1-6	CLO :2 PLO-1
14	23-09-2024	Rolle's theorem, Mean value theorem	**T.B:** 10.8 Page 626 Q1-5	CLO :2 PLO-1
15	24-09-2024	Taylor's and McLaurin's series	**T.B:** 10.8 Page 626 Q11-15	CLO :2 PLO-1
16	30-09-2024	Functions of more than one variables Partial derivatives Chain rule	**T.B:** 14.3 Page 818 Q1-Q5 14.4 Page 1003 Q1-6	CLO :2 PLO-1
MID TERM EXAMINATION (02-12-2024 to 07-12-2025)				
17	09-12-2024	Maxima and minima of functions of two variables(partial differentiation)	14.7 Page 856 Q1-Q4	CLO :3 PLO-1
18	10-12-2024	Indefinite integrals, Riemann sums and definite integrals, fundamental theorems of integral calculus Integration by substitution.	**T.B** 8.1 Page 448 Q1-Q6 Q10-Q16	CLO :3 PLO-1

19	16-12-2024	Integration by parts, tabular and repeated by parts	8.2 Page 457-458 Q1-8	CLO :3 PLO-1
20	17-12-2024	Integration by partial fraction	**T.B** 8.5 Page 477 Q9-16 Q21,22 Q 17, Q19	CLO :3 PLO-1
21	23-12-2024	Integration by partial fraction	8.3 Page 465-466 Q1-12	CLO :3 PLO-1
23	24-12-2024	Integration by tabular and repeated by parts methods		CLO :3 PLO-1
24	30-12-2024	Integration of trigonometric integrals	8.3 Page 465-466 Q1-12	CLO :3 PLO-1
25	31-12-2024	Application of integration to find area and volume, area between curves	**T.B** 8.4 Page 470 5.4 Page 288 Ex 6 Q51-52	CLO :3 PLO-1 **Quiz 3**
26	01-01-2025	Double integrals Application in finding area	**T.B:** 15.1 Page 887 Q1-Q8 Ex2	CLO :3 PLO-1
27	02-01-2025	Triple integrals Application in finding area	**T.B:** 15.1	CLO :3 PLO-1
28	08-01-2025	Review of vector Algebra: Vector addition, scalar multiplication, dot and cross products .	**T.B:** 12.2 Q1-Q8 **T.**B: 12.3 Q1-10 Q43 Example 8	CLO :3 PLO-1
29	09-01-2025	Volume of parallelepiped and tetrahedron.	12.4 Q1-8 Q15-16Q35,41 12.5 Q1-10 Q47.48	CLO :3 PLO-1
30	15-01-2025	Polar spherical and rectangular coordinates system in three dimensions	**T.B:** 11.3 Q6. Q7 Q27-36	CLO :3 PLO-1

31	16-01-2025	Parametric equations, Equations of straight lineEquations of plane	**T.B 12.5** Q1-10	CLO :3 PLO-1 **Assignment3**
32	22-01-2025	Equations of plane	Q **T.B 12.5** 21-24 Q47.48	CLO :3 PLO-1
FINAL EXAMINATION **(28-01-2025 to 08-02-2025)**				

*__T. B__ stands for recommended textbook: Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas' Calculus.

Name & Signature (Course Instructor): _____ Date _____

Name: & Signature (Head of Department):_____ Date: _____