UNITED INTERNATIONAL UNIVERSITY

Department of Computer Science and Engineering (CSE)

Course Syllabus

1	**Course Title**	Co-ordinate Geometry and Vector Analysis
2	**Course Code**	Math 201/Math 2201
3	**Trimester and Year**	Fall 2024
4	**Pre-requisites**	Math 003, Math 151
5	**Credit Hours**	3
6	**Section**	B, F, O
7	**Class Hours**	Sat/Tues-9.51-11.10, Sun/Wed- 8.30-950, 12.31-1.50
8	**Class Room**	801, 632
9	**Instructor's Name**	Sidratul Muntaha (SiMu), Adjunct Lecturer in Mathematics, INS.
10	**Email**	sidratuluiu@gmail.com, Mobile - 01619856155
11	**Office**	Room # 310
12	**Counseling Hours**	
13	**Textbook**	Calculus Early Transcendentals by Howard Anton, Irl Bivens, Stephen Davis [10th Edition]
14	**Reference**	Engineering Mathematics, H. K. Dass (HKD) [15th Edition]
15	**Course Contents (approved by UGC)**	Conic sections, rotation of axes, Rectangular co-ordinate in 3-space, cross and dot product of vectors, parametric equation of straight lines, Plane in 3-space, quadratic surfaces, Differentiation and integration of vector-valued function, tangent and normal vectors, directional derivative and gradient of scalar fields, Tangent planes and normal vectors, vector fields, line integrals, conservative vector field, Green's theorem. Triple integral in cylindrical and spherical coordinate systems, Surface integral, flux, divergence theorem, Stokes' theorem.
16	**Course Outcomes (Cos)**	

Cos	Description
CO1	Recognize different conic sections, coordinate systems, position vectors, and vector-valued functions.
CO2	Apply vector calculus in coordinate geometry and related applications of mathematics.
CO3	Solve multiple integral problems in cylindrical and spherical coordinate systems.
CO4	Analyze different theorems of vector calculus from the perspective of real-life applications.

17	**Teaching Methods**	Lecture, Case Studies, Assignments.
18	**CO with Assessment Methods**	
19	**Mapping of COs and Program outcomes**	

COs	**Program Outcomes (POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	√											
CO2	√	√										
CO3		√										
CO4		√										

20 Lecture Outline

Class	**Topics/Assignments**	**COs**	**Reading Reference**	**Lecture Outcome/ Activities**
1-3	Rectangular coordinates in 3-space, dot, and cross products of vectors.	1,2	Chapter 11.1,11.2,11.3,11.4	Quiz-1 Assignment-1
4-7	Parametric equation of straight lines, plane in 3-space, quadratic surfaces.	1,3	Chapter 11.5,11.6	
8-11	Double and triple integrals in rectangular coordinate systems.	3,4	Chapter 14.1,14.2,14.3,14.5	Quiz-2
12	Directional derivative, and gradient of scalar fields.	3,4	Chapter 13.6	
	Mid-term			
13-15	Triple integral in rectangular, polar, cylindrical, and spherical coordinate systems. Differentiation and integration of vector-valued function.	3,4	Chapter 11.8,14.6,12.1,12.2	Quiz-3
16-18	Vector field, Line integrals, conservative vector field, Green's theorem.	1,3,4	Chapter 15.1,15.2,15.3,15.4	Assignment-2
19-22	Surface integral, flux, divergence theorem, Stokes' theorem	2,3,4	Chapter 15.5,15.6,15.7,15.8	Quiz-4
23-24	Conic sections, rotation of axes.	1	Chapter 10.4,10.5	
	Final Examination			

Appendix 1: Assessment Methods

Assessment Types	Marks
Attendance	5%
Assignments	5%
Class Tests	20%
Mid Term	30%
Final Exam	40%

Appendix 2: Grading Policy

Letter Grade	Marks %	Grade Point	Letter Grade	Marks%	Grade Point
A (Plain)	90-100	4.00	C+ (Plus)	70-73	2.33
A- (Minus)	86-89	3.67	C (Plain)	66-69	2.00
B+ (Plus)	82-85	3.33	C- (Minus)	62-65	1.67
B (Plain)	78-81	3.00	D+ (Plus)	58-61	1.33
B- (Minus)	74-77	2.67	D (Plain)	55-57	1.00
			F (Fail)	<55	0.00

Appendix-3: Program outcomes

POs	Program Outcomes
PO1	An ability to apply knowledge of mathematics, science, and engineering
PO2	An ability to identify, formulate, and solve engineering problems
PO3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
PO4	An ability to design and conduct experiments, as well as to analyze and interpret data
PO5	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
PO6	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
PO7	A knowledge of contemporary issues
PO8	An understanding of professional and ethical responsibility
PO9	An ability to function on multidisciplinary teams
PO10	An ability to communicate effectively
PO11	Project Management and Finance
PO12	A recognition of the need for, and an ability to engage in lifelong learning

Lecture no		Chapter	Topics
	Conic sections, rotation of axes	10.4	Example-1, 2, 3, 4, 5, 6, 7, 8, 9, 10
		10.5	Example-1, 2, 3, 4 Exercise set 10.5(1, 3, 5, 7, 9, 11, 13, 19, 21, 23, 25, 27, 29)
	Rectangular coordinates in 3-space, dot and cross products of vectors, parametric equation of straight lines.	11.1	Example-1, 2, 3, 4
		11.2	Example-1, 2, 3, 4, 5, 6, 7, 8
		11.3	Example-1, 2, 3, 4, 5, 7, 8
		11.4	Example-1, 2, 3, 4, 5, Exercise-25 – 28

		11.5	Example-1,2,3,4,5,6 Exercise set-11.5(1, 3, 5, 7, 9, 11,13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 43)
	Plane in 3-space, quadratic surfaces	11.6	Example-1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Exercise set-11.6(1,3, 5, 7, 9, 11, 13, 15, 17, 19, 25, 27, 29, 31, 33, 35, 37, 41, 43, 45, 47)
	Differentiation and integration of vector-valued function, directional derivative, and gradient of scalar fields.	12.1	Example-1,2
		12.2	Example-1,2,3,7,8,9
		13.6	Exercise set-13.6(9,11,13,53,55,61,63)
	Vector fields, line integrals, conservative vector field, Green's theorem.		
		15.1	Example-2 – 5, Exercise-15.1(17, 19, 37, 38)
		15.2	Example- 5, 6, 7 Exercise set 15.2- (7, 9, 13, 23, 25, 27, 33, 34, 37)
		15.3	Example-1,2,3,4,5,6 Exercise set 15.3(1, 3, 5, 9, 11, 13)
		15.4	Example-1, 2, 3 Exercise set 15.4 (1, 3, 5,7, 9,11)
	Double and triple integral in rectangular, polar, cylindrical and spherical coordinate systems.	11.8	Exercise- set 11.8(1,3,5,7,9,11)
		14.1 14.2 14.3 14.5 14.6	**14.1:** Theorem 14.1.3, Examples: 1-4, Exercise Set 14.1: 1-16 **14.2:** Definition 14.2.1, Theorem 14.2.2, Examples: 1-8 Exercise Set 14.2: 1-8 (odd numbers), 9,10,15-18 **14.5:** Theorem 14.5.1-14.5.2, Examples: 1-5 Exercise Set 14.5: 1-12 **14.3:** Definition 14.3.1, Theorem 14.3.3, Examples: 1-4 Exercise Set 14.3: 1-10 14.6: Example-1,2,3,4
	Surface integral, flux, divergence theorem, Stokes' theorem.	15.5	Example-2, 3 Exercise set- 15.5 (1, 3, 5, 7)
		15.6	Example-2 Exercise set-15.6 (9,11, 13, 15)
		15.7	Example-1,2,3,4 Exercise set-15.7(1,3,9,11, 13, 15, 17)
		15.8	Example-1,2 Exercise set 15.8 (1,3,5,7,8)
Final Examinations			