King Fahd University of Petroleum and Minerals

Department of Mathematics

Math 201 – Syllabus Semester 222

Coordinator: Dr. Abdulaziz Alassaf (alassaf@kfupm.edu.sa)

Title: Calculus III

Credit: 3-0-3

Textbook: J. Stewart, Calculus (Early Transcendental) 8th edition, Brooks/Cole.

Description: Polar coordinates, polar curves, area in polar coordinates. Vectors, lines, planes, and surfaces. Cylindrical and spherical coordinates. Functions of two and three variables, limits, and continuity. Partial derivatives, directional derivatives. Extrema of functions of two variables. Double integrals, double integrals in polar coordinates. Triple integrals, triple integrals in cylindrical and spherical coordinates.

Learning Outcomes: Upon completion of the course, students should be able to

1. Describe parametric and polar curves in plane and recognize regions and quadric surfaces in space.
2. Calculate areas, slopes, surface area, arc length for plane curves.
3. Perform vector operations in space and find equations of lines and planes in space.
4. Determine the limits and continuity of multi-variable functions.
5. Calculate directional derivatives, equations of tangent planes, and gradient vectors.
6. Find extreme values of multi-variable functions.
7. Evaluate multiple integrals in rectangular, polar, cylindrical, and spherical coordinate systems.

Grading Policy:

Exam I Common Exam (MCQ)	Dat**e: Feb. 18, 2023** Time: TBA	Place: TBA Material: **[10.1-12.4]**	25% (100 points)
Exam 2 Common Exam (MCQ)	Date: **Mar. 29,2023** Time: TBA	Place: TBA Material: **[12.5-14.6]**	25% (100 points)
Final Exam Common Exam (MCQ)	Date: TBA Time: TBA	Place: TBA Material: comprehensive	35% (140 points)
Online Homework	provided through Blackboard		5% (20 points)
Class Work	❖ It is based on quizzes, class tests, attendance, or other class activities determined by the instructor. ❖ The average x (out of 40) of class activities of each section should be in the interval [28, 30].		10% (40 points)

Letter Grades: The letter grades will follow a grading curve, which depends on the average of all students in the course.

Exams' Questions: The questions of the exams are based on the examples, homework problems, and exercises in the textbook.

Cheating in Exams: Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will be reported to the higher university administration.

Cheating in exams includes (but is not limited to):

➢ looking at the papers of other students

➢ talking to other students

➢ using mobiles or any other electronic devices.

Exam Issues:

- No student will be allowed to take the exam without bringing his/her KFUPM ID or National/Iqama ID.
- Students are not allowed to carry mobiles, smart watches, or electronic devices to the exam halls/rooms.
- Students must take the exam in the place assigned to them.

Missing an Exam: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he/she must bring an official excuse from Students Affairs. Otherwise, he/she will get zero in the missed exam.

Attendance: Students are expected to attend all lecture classes.

➢ If a student misses a class, he/she is responsible for any announcement made in that class.

➢ A DN grade will be awarded to any student who accumulates more than 20% (09) unexcused absences or 33% (15) excused and unexcused absences.

Note: The student will be warned **twice** by his/her instructor before he/she is assigned a DN grade

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by the instructor.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin.

Pacing Schedule

Week	Dates	Section	Topics
1	Jan 15 – Jan 19	**10.1**	Curves determined by parametric equations
		10.2	Calculus with Parametric Curves
2	Jan 22 – Jan 26	**10.3**	Polar Coordinates
3	Jan 29 – Feb 2	**10.4**	Areas and Lengths in Polar Coordinates
		12.1	Three-Dimensional Coordinates Systems
4	Feb 5 – Feb 9	**12.2**	Vectors
		12.3	The Dot Product
5	Feb 12 – Feb 16	**12.4**	The Cross Product
		12.5	Equations of Lines and Planes
Saturday February 18, 2023: First Major Exam (MCQ) [10.1 – 12.4] Tentative Date			
6	Feb 19 – Feb 21	**12.5**	Continued.
		12.6	Cylinders and Quadric Surfaces
Saudi Foundation Day Holiday: February 22 – 23, 2023			
7	Feb 26 – Mar 2	**14.1**	Functions of Several Variables
		14.2	Limits and Continuity
8	Mar 5 – Mar 9	**14.3**	Partial Derivatives
		14.4	Tangent Planes & Linear Approximation
9	Mar 12 – Mar 16	**14.5**	The Chain Rule
		14.6	Directional Derivatives and the Gradient Vector
10	Mar 19 – Mar 23	**14.7**	Maximum and Minimum Values
Wednesday March 29, 2023: Second Major Exam (MCQ) [12.5 – 14.6] Tentative Date			
11	Mar 26 – Mar 30	**14.8**	Lagrange Multipliers
12	Apr 2 – Apr 6	**15.1**	Double Integrals over Rectangles
		15.2	Double Integrals over General Regions
13	Apr 9 – Apr 13	**15.3**	Double Integrals in Polar Coordinates
Eid Al-Fitr Holiday: April 14 – 29, 2023			
14	Apr 30 – May 4	**15.6**	Triple Integrals (Up to example 5)
		15.7	Triple Integrals in Cylindrical Coordinates
15	May 7 – May 11	**15.8**	Triple Integrals in Spherical Coordinates
16	May 14 – May 15		REVIEW & CATCH-UP
			Sunday May 14th, 2023: Normal Wednesday Classes Monday May 15th, 2023: Normal Thursday Classes
			Last day of classes for the term
Final Exam (MCQ): TBA (comprehensive)			

Suggested Practice Problems

Section	Problems
10.1	2, 3, 5, 7, 8, 10, 12, 14, 19, 24
10.2	4, 6, 8, 11, 15, 17, 19, 31, 41, 42, 61, 63, 66
10.3	1, 3, 5, 9, 10, 11, 13, 15, 17, 25, 35, 39, 40, 57, 61 10
10.4	3, 5, 8, 9, 24, 27, 29, 31, 37, 38, 45
12.1	3, 5, 6, 7, 8, 11, 12, 13, 22, 23, 31, 35, 45
12.2	2, 3, 4, 6, 7, 9, 13, 15, 17, 19, 21, 23, 25, 26, 29, 41, 43, 45
12.3	1, 3, 5, 7, 9, 11, 17, 19, 22, 23, 25, 26, 39, 43, 45, 47, 55, 64
12.4	1, 3, 5, 14, 17, 19, 28, 29,33, 36, 37, 43, 44
12.5	1, 3, 4, 5, 6, 7, 10, 11, 13, 15, 16, 20, 23, 25, 26, 27, 30, 31, 33, 35, 45, 48, 53
12.6	4, 6, 11, 13, 21-28, 32, 33, 35, 38, 47
14.1	9, 11, 13, 15, 16, 17, 19, 45, 47
14.2	1, 9, 11, 15, 33, 34, 36, 43
14.3	15, 16, 19, 29, 21, 22, 25, 27, 29, 31, 33, 34, 35, 41, 53, 61, 63, 69
14.4	3, 5, 11, 13, 19, 21, 25
14.5	1, 3, 5, 7, 9, 10, 21, 23, 31, 34, 39
14.6	7, 9, 11, 12, 15, 17, 20, 21, 24, 27, 28, 29, 38, 41
14.7	6, 9, 11, 16, 31, 33, 41, 43, 48, 51, 53 14
14.8	4, 6, 7, 15, 20, 21, 31, 34
15.1	2, 10, 11, 12, 19, 23, 30, 32, 42, 43, 48
15.2	3, 5, 7, 9, 11, 12, 15, 17, 19, 21, 25, 27, 29, 45, 49, 50, 52, 61
15.3	5, 8, 12, 13, 16, 19, 20, 26, 30, 33, 39
15.6	5, 6, 7, 8, 9, 11, 13, 14, 19, 21, 22, 29, 33
15.7	1, 3, 5, 6, 7, 9, 11, 15, 19, 21, 24, 29
15.8	2, 4, 5, 7, 10, 13, 17, 22, 23, 29, 30, 35, 41, 43

Tips on how to enhance your problem-solving abilities:

Do all homework assignments on time.

Practice (but not memorize) more problems than those in the above list. Solve review problems available at the end of each chapter.

Solve the problems on your own before reading the solution or asking for help.

If you find it difficult to handle a certain type of problems, you should try more problems of the same type.

Review the last lecture before each class.

Practicing homework problems and reviewing the class lectures will make exam problems easier to tackle.

Visit your instructor in his office hours. Always bring partial solution of the questions that you want to discuss with your instructor.