

King Fahd University of Petroleum and Minerals

Department of Mathematics

Math 201 – Syllabus Semester 223

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

Title: Calculus III

Credit: 3-0-3

Textbook: Calculus: Early Transcendental Functions, Metric Version, 7th edition, by Ron Larson and Bruce Edwards.

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)	Date: July 12, 2023 Time: TBA	Place: TBA Material: [10.2-11.4]	25% (100 points)
Exam 2 Common Exam (MCQ)	Date: July 27, 2023 Time: TBA	Place: TBA Material: [11.5-13.6]	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	<ul style="list-style-type: none">❖ 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 $[28, y]$ where $y = \text{Max} \{30, (\text{Ex1sec.ave.} + \text{Ex2sec.ave.})/2\}$.		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% (07) unexcused absences or 33% (12) 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	June 11 – June 15	10.2	Plane Curves and Parametric Equations
		10.3	Parametric Equations and Calculus
		10.4	Polar Coordinates and Polar Graphs
		10.5	Area and Arc Length in Polar Coordinates
2	June 18 – June 22	11.1	Vectors in the Plane
		11.2	Space Coordinates and Vectors in Space
		11.3	The Dot Product of Two Vectors
		11.4	The Cross Product of Two Vectors in Space
Eid al-Adha Holiday: June 23 – July 8, 2023			
3	July 9 – July 13	11.5	Lines and Planes in Space
		11.6	Surfaces in Space (Surfaces of Revolution is omitted)
		13.1	Introduction to Functions of Several Variables
Wednesday July 12, 2023: First Major Exam (MCQ) [10.2 – 11.4]			
4	July 16 – July 20	13.2	Limits and Continuity
		13.3	Partial Derivatives
		13.4	Differentials
		13.5	Chain Rules for Functions of Several Variables
5	July 23 – July 27	13.6	Directional Derivatives and Gradients
		13.7	Tangent Planes and Normal Lines
		13.8	Extrema of Functions of Two Variables
Thursday July 27, 2023: Second Major Exam (MCQ) [11.5 – 13.6]			
6	July 30 – Aug 3	13.9	Applications of Extrema (Only Optimization Problems)
		13.10	Lagrange Multipliers
		14.1	Iterated Integrals and Area in the Plane
		14.2	Double Integrals and Volume
7	Aug 6 – Aug 10	14.3	Change of Variables: Polar Coordinates
		14.6	Triple Integrals and Applications
		11.7	Cylindrical and Spherical Coordinates
8	Aug 13 – Aug 14	14.7	Triple Integrals in Other Coordinates
			REVIEW & CATCH-UP
Final Exam (MCQ): TBA (comprehensive)			

Suggested Practice Problems

Section	Problems
10.2	5, 7, 8, 9, 12, 18, 20, 22, 24, 26, 28, 32, 34, 39, 40, 44, 52, 55, 56, 59
10.3	6, 7, 9, 10, 14, 22, 23, 27, 30, 31, 33, 38, 45, 47, 49, 51, 57, 63, 64, 77, 79, 91
10.4	5, 6, 7, 8, 16, 21, 28, 31, 34, 37, 43, 41, 45, 53, 57, 59, 64, 69, 71, 87
10.5	3, 4, 8, 10, 13, 17, 21, 34, 27, 30, 37, 40, 44, 47, 55, 57, 75, 76
11.1	3, 4, 8, 9, 12, 17, 27, 35, 39, 45, 49, 53, 61, 67, 74
11.2	5, 9, 10, 15, 21, 22, 29, 39, 41, 43, 45, 55, 63, 67, 69, 79, 83, 89
11.3	5, 11, 13, 21, 27, 31, 41, 43, 51, 53, 65
11.4	8, 12, 15, 20, 23, 26, 33, 35, 37, 44, 45, 46
11.5	5, 9, 12, 13, 17, 19, 23, 27, 31, 33, 45, 48, 51, 52, 53, 57, 61, 67, 71, 83, 89, 91, 99
11.6	6, 9, 17, 24, 23, 45, 46
13.1	6, 8, 15, 17, 20, 25, 29, 32, 39, 40, 47, 48, 56, 60
13.2	10, 15, 16, 22, 35, 42, 44, 49, 50, 51, 53, 57, 60, 62, 63, 66, 71, 83
13.3	5, 9, 10, 19, 21, 23, 27, 37, 39, 40, 51, 54, 62, 65, 69, 73, 75, 83, 89, 93, 99, 116, 131
13.4	5, 7, 14, 21, 22, 23, 24, 39
13.5	4, 6, 7, 9, 13, 14, 16, 18, 21, 22, 23, 25, 31, 34, 37, 39, 43
13.6	5, 9, 11, 13, 17, 18, 24, 28, 29, 31, 36, 39, 45, 55
13.7	5, 7, 10, 14, 23, 25, 27, 31, 33, 35, 37, 42, 43, 45, 49
13.8	3, 7, 9, 15, 20, 27, 31, 33, 38, 39, 41, 43, 47, 53
13.9	3, 5, 7, 9, 10, 11, 12, 15, 16
13.10	3, 5, 9, 11, 17, 19, 29, 46
14.1	8, 9, 17, 19, 20, 23, 24, 31, 32, 41, 43, 49, 53, 57, 61, 62, 65, 80
14.2	5, 7, 11, 13, 15, 19, 21, 20, 23, 25, 27, 31, 34, 35, 37, 39, 51, 56
14.3	5, 7, 9, 16, 17, 21, 23, 25, 27, 30, 31, 35, 36, 37, 38, 43, 45, 47, 49
14.6	7, 9, 11, 13, 14, 15, 18, 19, 23, 24, 25, 27, 35
11.7	3, 5, 9, 11, 15, 16, 17, 21, 25, 27, 30, 33, 35, 37, 41, 45, 50, 53, 58, 59, 65, 81, 101, 102
14.7	7, 8, 11, 15, 17, 18, 21, 31, 32, 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.