King Fahd University of Petroleum and Minerals

Department of Mathematics

Math 201 Syllabus, Term 252 (2026)

Coordinator: Dr. Faisal A. Fairag (ffairag@kfupm.edu.sa)

Course Code and Title: Math 201- Calculus III

Course Credit Hours: 3-0-3

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

Course 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.

Course 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 multivariable functions.
5. Calculate directional derivatives, equations of tangent planes, and gradient vectors.
6. Find extreme values of multi-variables functions.
7. Evaluate multiple integrals in rectangular, polar, cylindrical, and spherical coordinate systems.

Grading Policy:

Exam I (15 MCQ)	**Date: 17 Feb 2026**	**Place: TBA**	25% (75 points)
	Time: TBA	**Material: [10.2-11.4]**	
Exam II (15 MCQ)	**Date: 14 April. 2026**	**Place: TBA**	25% (75 points)
	Time: TBA	**Material: [11.5-13.7]**	
Final Exam (21 MCQ)	**Date: TBA**	**Place: TBA**	35% (105 points)
	Time: TBA	**Material:** Comprehensive	
Class Work	➢ It is based on quizzes, class tests, attendance, or other class activities determined by the instructor. ➢ The average (out of 45) of the class work of each section has to be in the interval $[y - 1.5, y + 1.5]$, where $y = \frac{9}{40}(median\ Ex1\% + median\ Ex2\%)$		15% (45 points)
		TOTAL	**100% (300 points)**

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

Exam Questions: The questions of the exams are similar to the examples 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 result in a grade of **DN** in the course along with reporting the incident to the higher university administration for further action. Cheating in exams includes (but is not restricted to):

- Looking at the papers of other students.
- Talking to other students.
- Using mobiles, smart watches or any other electronic devices.
- Using ChatGPT or any AI source.

Other Exam Issues:

- No student will be allowed to take the exam if he/she does not bring his/her KFUPM ID, or National/Iqama ID, or Driver's License with him/her to the exam hall.
- Students are not allowed to have their mobiles, smart watches, or any electronic device in the exam hall. A violation of this will be considered an attempt of cheating.
- A student must sit in the seat assigned to him/her. A violation of this will be considered an attempt of cheating.

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 a score of 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.
- After warned **twice** by the instructor, a DN grade will be awarded to any student who accumulates:
    - 09 unexcused absences in lectures. (20%)
    - 15 excused and unexcused absences in lectures. (≈33%)

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 in the Registrar's website.

Pacing Schedule

Week	Dates (2024)	Section	Topics (26 sections)
1	Jan. 11-15	**10.2**	Plane Curves and Parametric Equations
		10.3	Parametric Equations and Calculus
2	Jan. 18- 22	**10.4**	Polar Coordinates and Polar Graphs
		10.5	Area and Arc Length in Polar Coordinates
3	Jan. 25-29	**10.5**	Continued
		11.1	Vectors in the Plane
4	Feb. 1-5	**11.2**	Space Coordinates and Vectors in Space
		11.3	The Dot Product of Two Vectors
5	Feb. 8-12	**11.4**	The Cross Product of Two Vectors in Space
		11.5	Lines and Planes in Space (**Including skew lines**)
6	Feb. 15-19	**11.5**	Continued
Exam I: 17 Feb 2026 (Tuesday); [10.2-11.4];			
7	Feb. 23-26	**11.6**	Surfaces in Space (Surfaces of Revolution is omitted)
		13.1	Introduction to Functions of Several Variables
Sunday, Feb 22: Saudi Founding Day (5 Ramadhan)			
8	Mar 1-5	**13.2**	Limits and Continuity (**Excluding Epsilon-delta definition**)
		13.3	Partial Derivatives
9	Mar 8-12	**13.4**	Differentials
		13.5	Chain Rules for Functions of Several Variables
March 15-26 Eid Al-Fitr Holidays			
10	Mar 29-April 2	**13.6**	Directional Derivatives and Gradients
		13.7	Tangent Planes and Normal Lines
11	April 5-9	**13.8**	Extrema of Functions of Two Variables
		13.9	Applications of Extrema (Only Optimization Problems)
12	April 12-16	**13.10**	Lagrange Multipliers
		14.1	Iterated Integrals and Area in the Plane
Exam II: 14 April 2026 (Tuesday); [11.5-13.7];			
13	April 19-23	**14.2**	Double Integrals and Volume
		14.3	Change of Variables: Polar Coordinates
14	April 26-30	**14.6**	Triple Integrals and Applications
		11.7	Cylindrical and Spherical Coordinates
15	May 3-7	**14.7**	Triple Integrals in Other Coordinates
16	May 10		**Review / Catching up**
Final Exam (MCQ): Comprehensive			

Suggested Practice Problems

Section	Problems
10.2	6, 8, 9, 11, 18, 19, 22, 24, 26, 28, 32, 37, 38, 42, 44, 52, 55, 71-74
10.3	6, 10, 17, 22, 26, 31, 36, 39, 45, 47, 51, 53, 66, 67, 77, **79,** 83, 91
10.4	6, 7, 16, 21, 28, 31,34, 37, 42, 43, 45, 53, 59, 64, 69, 77, 88, 102
10.5	5, 8, 10, 13, 18, 21, 24, 27, 30, 37, 38, 44, 47, 55, 57, 65, 67, 80
11.1	3, 8, 12, 27, 35, 40, 45, 50, 53, 61, 68, 74
11.2	6, 10, 11, 15, 22, 26, 29, 31, 34, 39, 41, 43, 45, 54, 55, 62, 63, 67, 71, 76, 79, 86, 87, 89, 96
11.3	5, 11, 18, 20, 25, 27, 30, 32, 41, 44, 53, 65
11.4	8, 12, 15, 20, 26, 33, 35, 44, 45, 46
11.5	5, 9, 12, 14, 17, 20, 23, 27, 31, 33, 38, 43, 45, 48, 51, 53, 57, 62, 67, 71, 72, 80, 83, 89, 92, 96, 99 **Section Project (Skew lines):** (a), (b), (c), (d)
11.6	6, 9, 11, 12, 17, 24, 45, 46, 50
13.1	7, 8, 15, 18, 28, 29, 32, 35, 38, 40, 47, 54, 58, 75, 76
13.2	10, 15, 16, 22, 28, 30, 31, 35, 42, 44, 47, 49, 51, 53, 58, 60, 62, 63, 66, 71, 77, 83, 84
13.3	5, 10, 19, 22, 27, 38, 39, 41, 48, 49, 51, 54, 60, 67, 69, 73, 82, 93, 98, 99, 116, 129, 131
13.4	5, 7, 14, 17, 18, 21, 22, 23, 24, 28, 36, 39
13.5	4, 9, 13, 18, 22, 23, 31, 34, 37, 39, 44, 47
13.6	5, 9, 12, 17, 20, 24, 28, 29, 36, 39, 45, 57, 68
13.7	5, 7, 10, 14, 23, 25, 27, 31, 35, 37, 40, 43, 46, 49, 59
13.8	3, 7, 10, 15, 20, 28, 31, 34, 38, 39, 42, 43, 47, 53
13.9	4, 5, 7, 9, 10, 13, 15
13.10	4, 7, 9, 11, 12, 15, 17, 19, 23, 28, 30, 46
14.1	8, 9, 17, 19, 20, 23, 24, 29, 32, 34, 41, 43, 49, 53, 57, 61, 66, 77, 80
14.2	5, 7, 12, 13, 15, 19, 21, 23, 25, 31, 34, 35, 37, 39, 45, 50, 51, 54
14.3	6, 7, 9, 16, 17, 21, 23, 25, 27, 30, 31, 35, 38, 43, 45, 47, 50
14.6	7, 10, 11, 13, 14, 15, 18, 19, 23, 24, 25, 27, 31, 35, 63, 66, 72
11.7	5, 11, 16, 20, 25, 27, 34, 37, 39, 45, 48, 53, 58, 59, 66, 74, 76, 81, 88, 92
14.7	7, 8, 12, 15, 17, 18, 20, 31, 32, 41, 44

Note: Check the True-False Questions in each section.

Tips on how to enhance your problem-solving abilities:

- 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/her office hours. Always bring partial solutions of the questions that you want to discuss with your instructor.