King Fahd University of Petroleum and Minerals

Department of Mathematics

Math 201 Syllabus, Term 212 (2021-2022)

Coordinator: Dr. Khalid Alanezy (alanezy@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 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: Wednesday, Feb. 23, 2022	Place: TBA	25% (75 points)
	Time: TBA	Material: [10.1-12.4]	
Exam 2 (15 MCQ)	Date: Wednesday, March 23, 2022	Place: TBA	25% (75 points)
	Time: TBA	Material: [12.5-14.6]	
Final Exam (21 MCQ)	Date: TBA	Place: TBA	35% (105 points)
	Time: TBA	Material: Comprehensive	
Online Homework	In WebAssign through Blackboard		5% (15 points)
Class Work	It is based on quizzes, class tests, attendance, or other class activities determined by the instructor. Any quiz or test under class activity should be of **written type and not of multiple-choice type.** The average x (out of 30) of class activities **of each section** should be in the interval [21, 22.5].		10% (30 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 result in a grade of F 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 or any other electronic devices.

- **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 must bring an official excuse from Students Affairs. Otherwise, he will get zero in the missed exam.

- **Attendance:** Students are expected to attend all lecture classes.
  ➢ If a student misses a class, he is responsible for any announcement made in that class.
  ➢ A DN grade will be awarded to any student who accumulates more than 20% unexcused absences (9 lectures) or 33% excused and unexcused absences (15 lectures)
  Note: Absences are counted as follows:
  - For UTR-Lectures, missing one lecture is counted as 1 absence.
  - For MW-Lectures, missing one lecture is counted as 1.5 absence.

- **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 (24 sections)
1	Jan. 16- 20	10.1	Curves defined by Parametric Equations
		10.2	Calculus with Parametric Curves
2	Jan. 23- 27	10.3	Polar Coordinates
3	Jan. 30- Feb. 3	10.4	Areas and Lengths in Polar Coordinates
		12.1	Three-Dimensional Coordinates Systems
4	Feb. 6- 10	12.2	Vectors
		12.3	The Dot Product
5	Feb. 13- 17	12.4	The Cross Product
		12.5	Equations of Lines and Planes
6	Feb. 20- 24	12.5	Continued.
		12.6	Cylinders and Quadric Surfaces
	Exam I: [10.1 – 12.4]		
7	Feb. 27- March 3	14.1	Functions of Several Variables
		14.2	Limits and Continuity
8	March 6- 10	14.3	Partial Derivatives
		14.4	Tangent Planes and Linear Approximations
9	March 13- 17	14.5	The Chain Rule
		14.6	Directional Derivatives and the Gradient Vector
10	March 20- 24	14.7	Maximum and Minimum Values
	Exam II: [12.5 – 14.6]		
11	March 27- 31	14.8	Lagrange Multipliers
12	April 3- 7	15.1	Double Integrals over Rectangles
		15.2	Double Integrals over General Regions
13	April 10- 14	15.3	Double Integrals in Polar Coordinates
		15.6	Triple Integrals
14	April 17- 21	15.6	Continued.
		15.7	Triple Integrals in Cylindrical Coordinates
	Eid Al-Fitr Holiday		
15	May 8- 12	15.8	Triple Integrals in Spherical Coordinates
			REVIEW and/or CATCHUP
	Final Exam (MCQ): 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
10.4	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
14.8	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 solutions of the questions that you want to discuss with your instructor.