King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Math 201 – Syllabus Semester 211

Coordinator: Prof. Jawad Abuihlail (abuhlail@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 Common Exam (MCQ)	Date: **6.10.2021** Time: TBA	Place: TBA Material: **[10.1-12.4]**	25% (75 points)
Exam 2 Common Exam (MCQ)	Date: **10.11.2021** Time: TBA	Place: TBA Material: **[12.5-14.6]**	25% (75 points)
Final Exam Common Exam (MCQ)	Date: TBA Time: TBA	Place: TBA Material: comprehensive	35% (105 points)
Online Homework	provided 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)

- **In person:** All lectures/exams will be conducted **in person and not online** (insha Allah).

- **Letter Grades:** The letter grades will follow a grading curve, which depends on the average of all student 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.

- **Missing an Exam:**

  Exam I or Exam: No make-up exam will be given under any circumstances to students missing any of these exams. In case a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for that exam will be determined based on the existing formula, which depends of his performance in the non-missed exam and in the final exam.

  Final Exam: If a student misses the final exam for a legitimate reason (such as medical emergencies), he will be given a make-up final 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 or 33% excused and unexcused absences.

- **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	29 Aug – 2 Sep	10.1	Curves determined by parametric equations
		10.2	Calculus with Parametric Curves
2	5 Sep – 9 Sep	10.3	Polar Coordinates
3	12 Sep – 16 Sep	10.4	Areas and Lengths in Polar Coordinates
		12.1	Three-Dimensional Coordinates Systems
4	19 Sep – 22 Sep	12.2	Vectors
		12.3	The Dot Product
Thursday 23rd September 2021: National Day Holiday			
5	26 Sep – 30 Sep	12.4	The Cross Product
		12.5	Equations of Lines and Planes
6	3 Oct – 7 Oct	12.5	Continued.
		12.6	Cylinders and Quadric Surfaces
		Wednesday 6.10.2021: First Major Exam [10.1 – 12.4]	
7	10 Oct – 14 Oct	14.1	Functions of Several Variables
		14.2	Limits and Continuity
8	Sunday 17th October 2021: Student Break		
	18 Oct – 21 Oct	14.3	Partial Derivatives
		14.4	Tangent Planes & Linear Approximation
9	24 Oct – 28 Oct	14.5	The Chain Rule
		14.6	Directional Derivatives and the Gradient Vector
10	31 Oct – 4 Nov	14.7	Maximum and Minimum Values
11	7 Nov – 11 Nov	14.8	Lagrange Multipliers
		Wednesday 10.11.2021: Second Major Exam [12.5 – 14.6]	
12	14 Nov – 18 Nov	15.1	Double Integrals over Rectangles
		15.2	Double Integrals over General Regions
13	21 Nov – 25 Nov	15.3	Double Integrals in Polar Coordinates
		15.4	Triple Integrals
Midterm Break: 28th November 2021 – 2nd December 2021			
14	5 Dec – 9 Dec	15.4	Continued.
		15.7	Triple Integrals in Cylindrical Coordinates
15	12 Dec – 16 Dec	15.8	Triple Integrals in Spherical Coordinates
			REVIEW & CATCHUP
16	19 Dec – 20 Dec		**REVIEW & CATCHUP**
			Monday 20th December 2021: Normal Thursday Class 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.