

# King Fahd University of Petroleum and Minerals

## Department of Mathematics & Statistics

### MATH 201 – Syllabus Term 181

Coordinator: Dr. Adel Khalfallah

**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 this course, students should be able to

- Explain the techniques of analytic geometry in the plane and in the space;
- Explain the concept of vectors and parametric equations in the plane and in the space;
- Graph essential surfaces, compute limits and continuity, partial derivatives, directional derivatives, and the gradient vector;
- Explain the concept of differentiability, tangent planes, and chain rule;
- Find and classify extreme values of functions of two variables, including Lagrange multipliers for constrained optimization problems;
- Compute multiple integrals with rectangular, polar, cylindrical, and spherical coordinates and identify some applications of the double and triple integrals.

#### Grading Policy:

<b>Exam I</b> Common Exam	Date: <b>Wednesday, Oct. 10, 2018</b>	Place: Bldg. 57	25%
	Time: 6:00 PM-8:00 PM	<b>Material:</b> 10.1 – 12.4	(100 Points)
<b>Exam II</b> Common Exam	Date: <b>Wednesday, Nov. 14, 2018</b>	Place: Bldg. 57	25%
	Time: 6:00 PM-8:00 PM	<b>Material:</b> 12.5 – 14.6	(100 Points)
<b>Final Exam</b> Common Exam	Date: <b>Sunday, Dec. 16, 2018</b>	Place: TBA	35%
	Time: 07:00 PM	<b>Material:</b> Comprehensive	(140 Points)
<b>Class Work</b>	<b>Online Homework:</b> Online homework is provided through <a href="#">BlackBoard</a>		5% (20 Points)
	<b>Class Activities:</b> It is based on quizzes, class tests, 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. <b>The average <math>x</math> (out of 40) of class activities of the sections taught by the same instructor should be in the interval <math>[28, 30]</math>.</b>		10% (40 Points)

**Passing Grade:** A student should achieve at least **50% (200 Points)** to pass this course.

**Exam Questions:** questions of the common exams are based on examples, homework problems and exercises in the textbook.

**Missing Exam I or Exam II:**

No makeup exam will be given under any circumstance. In case, a student miss Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula which depends on his performance in the non-missing exam and in the final exam.

**Attendance:** Attendance is a University Requirement (see p. 38 of the Undergraduate Bulletin 2006-2009). A DN grade will be awarded to any student who accumulates 09 unexcused absences.

**Academic Integrity:** All KFUPM policies regarding ethics apply to this course.

**Pacing Schedule**

Week	Date (2018)	Section	Topics (24 Sections)
1	Sept. 2 – 6	10.1 10.2	Curves Defined by Parametric Equations Calculus with Parametric Curves
2	Sept. 9 – 13	10.3	Polar Coordinates
3	Sept. 16 – 20	10.4 12.1	Areas and Lengths in Polar Coordinates Three-Dimensional Coordinates Systems
4	Sept. 24 – 27	12.2 12.3	Vectors The Dot Product
5	Sept. 29 – Oct. 4	12.4	The Cross Product
6	Oct. 7 – 11	12.5 12.6	Equations of Lines and Planes Cylinders and Quadric Surfaces
<b>Major Exam I (10.1 – 12.4) Wednesday, Oct. 10, 2018 at 06:00 PM</b>			
7	Oct. 14 – 18	14.1 14.2	Functions of Several Variables Limits and Continuity
8	Oct. 21 – 25	14.3 14.4	Partial Derivatives Tangent Planes & Linear Approximation
9	Oct. 28 – Nov. 1	14.5 14.6	The Chain Rule Directional Derivatives and the Gradient Vector
10	Nov. 4 – 8	14.7	Maximum and Minimum Values <a href="#">Review for Exam II</a>
11	Nov. 11 – 15	14.8	Lagrange Multipliers
<b>Major Exam II (12.5 – 14.6) Wednesday, Nov. 14, 2018 at 06:00 PM</b>			
12	Nov. 18 – 22	15.1 15.2	Double Integrals over Rectangles Double Integrals over General Regions
13	Nov. 25 – 29	15.3	Double Integrals in Polar Coordinates
14	Dec. 2 – 6	15.6 15.7	Triple Integrals Triple Integrals in Cylindrical Coordinates
15	Dec. 9 – 13	15.8	Triple Integrals in Spherical Coordinates
<b>Final Exam (Comprehensive) Sunday, Dec. 16, 2018 at 7:00 PM</b>			

### Suggested Practice Problems

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

#### Tips on how to enhance your problem-solving abilities (by compliments of Dr. Al-Rasasi, D)

- Do all homework assignments on time.
- Practice (but not memorize) more problems than those in the above list.
- Solve some of review problems available in the end of each chapter.
- Try to solve a problem 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 that type.
- Review the last lecture before coming to 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.