King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics

Math-106 Applied Calculus Term-213

Coordinator: Dr. Shahzad Sarwar
Email: shahzad.sarwar@kfupm.edu.sa

The Course Code and Name: Math 106, Applied Calculus.

The Course Credit Hours: 3-0-3

Instructor: Dr. Shahzad Sarwar

The Course Description: Limits and Continuity. The derivative. Rules for differentiation. Derivative of logarithmic, exponential, and trigonometric functions. Differentials. Growth and decay models. Definite and indefinite integrals. Techniques of integration. Integrals involving logarithmic, exponential, and trigonometric functions. Integration by tables. Area under a curve and between curves. Functions of several variables. Partial derivatives and their applications to optimization.

The Course Prerequisite: One-year preparatory mathematics or its equivalent.

Learning Outcomes: After completion of the course, the student should be able to:

1. Compute derivative of various functions using appropriate technique.
2. Use concepts of relative minima and/or maxima, absolute minimum and/or maximum and inflection points.
3. Solve problems in optimization and exponential growth and decay.
4. Evaluate integral of some algebraic and trigonometric functions and use the Fundamental Theorem of Calculus.
5. Compute area between curves.
6. Calculate partial derivatives of a function of several variables and classify extreme values of a function of two variables and apply them to optimization problems.
7. Use basic concepts of calculus in business and economics.

Textbook: Haeussler, Ernest F., Richard S. Paul, and Richard J. Wood. Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences (13th edition). Upper Saddle River, NJ: Pearson Prentice Hall, 2011.

Grading Policy:

	Date	Time	Place	Materials	Percentage
Exam I	22 June 2022	TBA	TBA	10.1- 12.1	25% (100 pts)
Exam II	21 July 2022	TBA	TBA	12.2 – 13.6	25% (100 pts)
Final Exam	TBA	TBA	TBA	Comprehensive	35% (140 pts)
Homework	----	----	----	----	5% (20 pts)
Class Work	▪ It is based on quizzes, class tests, attendance, or other class activities determined by the instructor. ▪ Any quiz or test should be of a written type and not of a multiple-choice type. ▪ The average (out of 40) of the class work of each section should be in the interval [28, 30].				10% (40 pts)

- ✓ **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 mobile phones, smart watches, 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: Missing one lecture is counted as 1.2 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.

Week	Date	Sec	Material	Selected Problems
1	June 5- 9	10.1 10.2 10.3 11.1 11.2	Limits Limits (cont'd) Continuity The derivative Rules for differentiation	4, 8, 17, 23, 36, 42, 44 2, 13, 15, 21, 29, 41, 47, 52, 58 6, 11, 22, 30, 36 12, 15, 18, 20, 25, 27 22, 33, 60, 72, 78, 85
2	June 12- 16	11.3 11.4 11.5 12.1	The derivative as a rate of change Product &quotient rule The chain rule & the power rule Derivative of logarithmic functions	8, 10, 12, 16, 21, 27, 40, 41 9, 15, 28,37,57,66 6, 13, 30, 41, 71, 73 16, 18, 20, 24, 28, 30, 32, 50
Exam I: Wednesday 22 June 2022, Material 10.1 – 12.1				
3	June 19- 23	12.2 12.4 12.5 12.7	Derivative of exponential functions Implicit differentiation Logarithmic differentiation Higher order derivative	10, 14, 16, 22, 28, 30, 38, 39 10, 14, 20, 22, 30, 34 7, 10, 14, 18, 20, 27 2, 8, 14, 30, 33, 35
4	June 26- 30	13.1 13.2 13.3 13.4 13.5	Relative extrema Absolute extrema on a closed interval Concavity The second derivative test Asymptotes	16, 18, 30, 38, 48, 52 2, 10, 12 12, 28, 40, 42, 60, 68 5, 6, 8, 10, 12 14, 20, 22, 34, 35, 45
Hajj Holiday: July 1-16, 2022.				
5	July 17- 21	13.6 14.1 14.2 14.3 14.4	Applied maxima and minima Differentials The definite integral Integration with initial conditions More integration formula	5, 14, 18, 22, 26 12, 14, 20, 22, 32 8, 10, 18, 27, 30, 45 5, 7, 11, 14,15 2, 10, 12, 15, 33, 35, 54
Exam II: Thursday 21 July 2022, Material 12.2 – 13.6				
6	July 24- 28	14.5 14.7 14.9 15.1 15.2	Techniques of integration Fundamental theorem of calculus Area between curves Integration by parts Integration by partial fractions	6, 12, 23, 30, 40, 44, 53, 63 16, 36, 42, 44, 48 1, 3, 5, 20, 33, 37, 46, 58 6, 8, 12, 18, 20, 24, 32
7	July 31- Aug. 4	15.3 17.1 17.4 17.6	Integration by tables Partial derivatives Higher order partial derivatives Maxima and minima for Function of two variables	5, 8, 18, 22, 31, 35 3, 8, 13, 20, 21, 24 4, 9, 17, 20, 22, 27, 29, 31
8	Aug. 7- 8		Revision	
Final Exam: Exact Date/Location TBA **(Comprehensive)**				