

King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 106 – Applied Calculus
Semester 191

Title: Applied Calculus (Math 106)
Credit: 3-0-3
Instructor: Raid F. Anabosi
Office: Building 5, Room 416
Email: anabosir@kfupm.edu.sa
Office Phone: 013 860 1851
Office Hours: UTR: 8:00 to 8:50 AM or by appointment

Textbook: Introductory Mathematical Analysis (for Business, Economics, and the Life and Social Sciences), by E. Haeussler, R. Paul and R. Wood, 13th edition, Pearson, 2014.

Course Description: 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.

Prerequisite: One-year preparatory mathematics or its equivalent

Learning Outcomes: By the end of the course, the student is expected to be able to:

- differentiate functions using the appropriate techniques from the following: power rule, product rule, quotient rule, chain rule;
- differentiate exponential functions, trigonometric functions and logarithmic functions;
- find the relative minima and/or maxima, absolute minimum and/or maximum and the inflection point(s) using differentiation;
- solve problems about optimization and exponential growth and decay using the concept of differentiation of a function of one variable.
- integrate some algebraic and trigonometric functions (and understand the relationship between the derivative and the integral of a function);
- use the Fundamental Theorem of Calculus to evaluate the integral of a function;
- calculate the area between two curves;
- classify extreme values of a function of two variables and apply them to optimization problems;
- apply the techniques of differentiation and integration to various applications in business and economics.

Grading Policy:

Exam I: 25% (75 points): MCQ, on Tuesday Oct. 8, 2019 (18:00 – 19:15) in B54.

Exam II: 25% (75 points): MCQ, on Tuesday Nov. 12, 2019 (17:30 – 18:45) in B54.

Class Work: 15% (45 points). 3 quizzes + Homework.

Final Exam: 35% (105 points): comprehensive & MCQ on Wednesday Dec. 18, 2019 in

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

Remark:

- No makeup quiz will be given under any circumstance. If a student misses a quiz, his grade for this quiz will be zero unless an official excuse from student affairs is presented on time; in this case the average of the other quizzes shall be considered for the missing quiz.
- **Missing One of the Two Common Major Exams I or II:** No makeup exam will be given under any circumstance for Major Exam I or II. If a student misses a major exam, his grade for that exam will be zero unless an official excuse from student affairs is presented on time; in this case, his grade in that exam will be determined by the existing formula of the department which depends on his performance in the other major and in the final exam.

Attendance: Attendance is a University Requirement. A DN grade will be awarded to any student who accumulates more than 9 unexcused classes.

Homework: The homework of any chapter, by default, is due to the first Sunday after completing the chapter, and no need to an announcement regarding this in advance.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. Tips on how to enhance your problem-solving abilities:

1. Please do all the homework assignments on time.
2. You are urged to practice (but not memorize) more problems than those in the list of HW problems.
3. You should always try to solve a problem on your own before reading the solution or asking for help.
4. If you find it difficult to handle a certain type of problems, you should try more problems of that type.
5. You are encouraged to solve some of the review problems at the end of each chapter.
6. The knowledge you get doing homework and reviewing the class lectures will make exam problems easier to tackle.
7. Solve old exams as part of your preparation for the major and final exams.
8. Try to make good use of the office hours of your instructor.

Week & Date	Section & Material	Homework
Week 1 01/9 – 05/9	10.1 Limits 10.2 Limits (continued) 10.3 Continuity	18, 22, 32, 40, 43 2, 15, 30, 39, 45, 50, 52, 58 6, 11, 22, 30, 36
Week 2 08/9 – 12/9	11.1 The derivative 11.2 Rules for differentiation 11.3 The derivative as a rate of change	12, 15, 18, 20, 25, 27 22, 33, 60, 72, 78, 85 8, 10, 12, 16, 21, 27, 40, 41
Week 3 15/9 – 19/9	11.4 Product & quotient rules 11.5 The chain rule & the power rule	9,15 , 28,37,57,66 6, 13, 30, 41, 71, 73
Week 4 22/9 – 26/9	12.1 Derivative of logarithmic functions 12.2 Derivative of exponential functions	16, 18, 20, 24, 28, 30, 32, 50 10, 14, 16, 22, 28, 30, 38,39
Week 5 29/9 – 04/10	12.4 Implicit differentiation 12.5 Logarithmic differentiation	10, 14, 20, 22, 30, 34 7, 10, 14, 18, 20, 27
Week 6 06/10 – 10/10	12.7 Higher order derivative 13.1 Relative extrema	2, 8, 14, 30, 33, 35 16, 18, 30, 38, 48, 52
Exam I [Ch. 10, 11, 12] Tuesday Oct. 8, 2019 (18:00 – 19:15) in Building 54		
Week 7 13/10 – 17/10	13.2 Absolute extrema on a closed interval 13.3 Concavity	2, 10, 12 12, 28, 40, 42, 60, 68
Week 8 20/10 – 24/10	13.4 The second derivative test 13.5 Asymptotes	5, 6, 8, 10, 12 14, 20, 22, 34, 35, 45
Week 9 27/10 – 31/10	13.6 Applied maxima and minima 14.1 Differentials	4, 15, 18, 22, 26 12, 14, 20, 22, 29
Week 10 03/11 – 07/11	14.2 The indefinite integral 14.3 Integration with initial conditions	8, 10, 18, 27, 30, 45 5, 7, 11, 14,15
Week 11 10/11 – 14/11	14.4 More integration formulas 14.5 Techniques of integration	9, 12, 15, 33, 35, 52 6, 12, 23, 30, 40, 44, 53,63
Exam II [Ch. 13, 14.5] Tuesday Nov. 12, 2019 (17:30 – 18:45) in Building 54		
Week 12 17/11 – 21/11	14.7 Fundamental theorem of calculus 14.9 Area between curves	16,36 ,42 ,44,48
Week 13 24/11 – 28/11	15.1 Integration by parts 15.3 Integration by tables	1, 3, 5, 20, 33, 37, 46, 58
Week 14 01/12 – 05/12	Handout: Derivative and integrals of trigonometric Functions 17.1 Partial derivatives	6, 8, 12, 18, 20, 24, 32 2,8, 18, 20, 24, 30, 35
Week 15 08/12 – 12/12	17.4 Higher order partial derivatives 17.6 Maxima and minima	6, 8, 12, 18, 20,21, 23 4, 9, 17, 19, 22, 26, 29
Week 16 15/12 – 18/12	Normal Monday & Exam preparation break	
Final Exam [Comprehensive] Wednesday Dec. 18, 2019 at 8:00 in		