Title: Applied Calculus (Math 106)

Credit: 3-0-3

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

Quizzes		**10% (30 points)**
Homework		**5% (15 points)**
Major Exam-I	**Sunday, February 20 at 6:30 PM**	**25% (75 Points)**
Major Exam-II	**Sunday, March 27 at 6:30 PM**	**25% (75 Points)**
Final Exam (comprehensive)	**Follow the registrar schedule**	**35% (105 points)**

Remarks:

* The questions of all assessments are MCQ and are based on the examples and exercises of the Textbook.

**The average (out of 30) of the class work grade should be in the interval [21, 22.5], that is, [70%, 75%]

Tentative Classes Pacing Schedule

Week	Date	Section	Material	Homework
1	Jan. 16 - 20	10.1	Limits	4, 8, 17, 23, 36, 42, 44
		10.2	Limits (cont'd)	2, 13, 15, 21, 29, 41, 47, 52, 58
		10.3	Continuity	6, 11, 22, 30, 36
2	Jan. 23 - 27	11.1	The derivative	12, 15, 18, 20, 25, 27
		11.2	Rules for differentiation	22, 33, 60, 72, 78, 85
		11.3	The derivative as a rate of change	8, 10, 12, 16, 21, 27, 40, 41
3	Jan. 30- Feb.3	11.4	Product &quotient rule	9, 15 , 28, 37, 57, 66
		11.5	The chain rule & the power rule	6, 13, 30, 41, 71,73
4	Feb. 6 – 10	12.1	Derivative of logarithmic functions	16, 18, 20, 24, 28, 30, 32, 50
		12.2	Derivative of exponential functions	10, 14, 16, 22, 28, 30, 38,39
5	Feb. 13 – 17	12.4	Implicit differentiation	10, 14, 20, 22, 30, 34
		12.5	Logarithmic differentiation	7, 10, 14, 18, 20, 27
		12.7	Higher order derivative	2, 8, 14, 30, 33, 35
6	Feb. 20- 24		Catch up / Revision	
		Exam I, Date: February 20, 2022 Time: 6:30 PM **Place: TBA; Material: Ch. 10, 11 & 12.1-12.4 (25%)**		
7	Feb. 27- March 3	13.1	Relative extrema	16, 18, 30, 38, 48, 52
		13.2	Absolute extrema on a closed interval	2, 6, 10, 12
		13.3	Concavity	12, 28, 40, 42, 60, 68
8	March 6 - 10	13.4	The second derivative test	5, 6, 8, 10, 12
		13.5	Asymptotes	14, 20, 22, 34, 35, 45
		13.6	Applied maxima and minima	4, 15, 18, 22, 26
9	March 13 –17	14.1	Differentials	12, 14, 20, 22, 29
		14.2	The indefinite integral	8, 10, 18, 27, 30, 45
10	March 20 – 24	14.3	Integration with initial conditions	5, 7, 11, 14,15
		14.4	More integration formulas	9, 12, 15, 33, 35, 52
		14.5	Techniques of integration	6, 12, 23, 30, 40, 44, 53,63
11	March 27- 31	14.7	Fundamental theorem of calculus	16,36, 42, 44,48
		14.9	Area between curves	1, 3, 5, 20, 33, 37,46,58
		Exam II: Sunday, March 27, 2022 Time: 6:30 PM **Place: TBA Material: Ch. 12.5-12.7,13 & 14.1-14.5 (25%)**		
12	April 3 – 7	15.1	Integration by parts	6, 8, 12, 18, 20, 24, 32
		15.3	Integration by tables	
13	April 10 – 14	Handout	Derivative and integrals of trigonometric Functions	
14	April 17 – 21	17.1	Partial derivatives	2,8, 18, 20, 24, 30, 35
		17.4	Higher order partial derivatives	6, 8, 12, 18, 20,21, 23
	April 24 – May 7	**Eid AL Fitr Vacation**		
15	May 8 – 12	17.6	Maxima and minima	4, 9, 17, 19, 22, 26, 29

Final Exam: 35% (105 points), a **comprehensive multiple-choice exam. (Date: TBA** by the registrar**)**

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 classes. University regulations will be applied concerning the absences.

Usage of Calculators: Calculators are not allowed in all exams.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin on the webpage of the Registrar.

Tips on How to Enhance Your Problem-Solving Skills:
- Make sure you understand the concepts and techniques of each section.
- Take notes during classes and study your notes, textbook, and, if available, lecture slides before your next class.
- Review the lecture to consolidate your learning and locate any missed points.
- Try always to solve the problems on your own first before reading the solution or asking for help.
- If you find it difficult to solve a certain type of problems, you should try more problems of that type.
- Try to make good use of the office hours of your instructor.
- Solve old exams as part of your preparation for the Midterm and Final Exams.
- Last, but not least, consult your instructor whenever you feel you need help understanding a concept or solving a problem.