



# KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

## DEPARTMENT OF MATHEMATICS

### Math 106 Syllabus, Term 223 (Academic Year 2023)

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

**Course Credit Hours:** 3-0-3

**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.

**Learning outcomes:** Upon completion of this course, students 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 the 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.

#### Grading Policy:

	Date	Time	Place	Materials	Percentage
<b>Exam I</b> (20 MCQs)	July 12, 2023	TBA	TBA	10.1-12.2	25% (100 pts)
<b>Exam II</b> (20 MCQs)	July 27, 2023	TBA	TBA	12.4-14.1	25% (100 pts)
<b>Final Exam</b> (28 MCQs)	TBA	TBA	TBA	Comprehensive	35% (140 pts)
<b>Homework</b>					5% (20 pts)
<b>Class Work</b>	<ul style="list-style-type: none"><li>▪ It is based on quizzes, class tests or other class activities determined by the instructor.</li><li>▪ The average (out of 40) of the class work of each section should be in the interval [28, 30].</li></ul>				10% (40 pts)
<b>Total</b>					100% (400)

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

#### Exam Policy:

- Student is not allowed to enter the exam hall without either KFUPM ID or Saudi/Iqama ID.
- Students are not allowed to carry **mobile phones and smart watches** to the exam halls.

**Exam Questions:** The questions of the exams are based on 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 **DN** in the course along with reporting the incident 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 **including Smart Watch**

**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), she/he must bring an official excuse from Students Affairs. Otherwise, she/he will get zero in the missed exam.

**Attendance:** Students are expected to attend all lecture and recitation classes.

- If a student misses a class, she/he is responsible for any announcement made in that class.
- A DN grade will be awarded to the eligible student after their instructors have warned them twice and who accumulates:
  - 8 (20%) unexcused absences in lecture classes.
  - 13 (33%) excused and unexcused absences in lecture classes.

**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 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 major exams and Final Exams.
- ❖ Last, but not least, consult your instructor whenever you feel you need help understanding a concept or solving a problem

## Syllabus – A rough weekly guideline

Week #	Date	Section	Material	Suggested Problems
1	June 11-15	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
		11.1	The derivative	12, 15, 18, 20, 25, 27
		11.2	Rules for differentiation	22, 33, 60, 72, 78, 85
2	June 18-22	11.3	The derivative as a rate of change	8, 10, 12, 16, 21, 27, 40, 41
		11.4	Product &quot;quot; rule	9, 15, 28, 37, 57, 66
		11.5	The chain rule & the power rule	6, 13, 30, 41, 71, 73
		12.1	Derivative of logarithmic functions	16, 18, 20, 24, 28, 30, 32, 50
<b>Hajj Holidays 25 Jun to 8 July</b>				
3	July 09-13	12.2	Derivative of exponential functions	10, 14, 16, 22, 28, 30, 38, 39
		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
4	July 16-20	13.1	Relative extrema	16, 18, 30, 38, 48, 52
		13.2	Absolute extrema on a closed interval	2, 10, 12
		13.3	Concavity	12, 28, 40, 42, 60, 68
		13.4	The second derivative test	5, 6, 8, 10, 12
		13.5	Asymptotes	14, 20, 22, 34, 35, 45
5	July 23-27	13.6	Applied maxima and minima.	4, 15, 18, 22, 26
		14.1	Differentials	12, 14, 20, 22, 32
		14.2	The definite integral	8, 10, 18, 27, 30, 45
		14.3	Integration with initial conditions	5, 7, 11, 14, 15
		14.4	More integration formula	9, 12, 15, 33, 35, 52
6	July 30-Aug 03	14.5	Techniques of integration	6, 12, 23, 30, 40, 44, 53, 63
		14.7	Fundamental theorem of calculus	16, 36, 42, 44, 48
		14.9	Area between curves	1, 3, 5, 20, 33, 37, 46, 58
		Handouts	Differentiation and Integration of Trigonometric Functions	-
15.1	Integration by parts	6, 8, 12, 18, 20, 24, 32		
7	Aug 06-10	15.3	Integration by tables	3, 7, 9, 14, 20, 36, 44, 54
		17.1	Partial derivatives	12, 8, 18, 20, 24, 30, 35
		17.4	Higher order partial derivatives	6, 8, 12, 18, 20, 21, 23
		17.6	Maxima and minima for Function of two variables	4, 9, 17, 19, 22, 26, 29
8	Aug. 13-14	-	CONT./REVIEW and/or CATCHING UP	
<b>Final Exam (Comprehensive): As posted on the Registrar Website</b>				

\* Expressing the percentage rate of change in revenue in terms of the percentage rate of change in price using the elasticity of demand is beyond the scope of the course, since Section 12.3 is not included.