

King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 101 – Syllabus (Term 192)
Coordinator: Dr. Ahmed Bonfoh

Code and Name: MATH101, Calculus I

Credit: 4-0-4

Textbook: Calculus (Early Transcendental) by J. Stewart, 8th edition, Cengage Learning, 2016.

Description: Limits and continuity of functions of a single variable. Differentiability. Techniques of differentiation. Implicit differentiation. Local extrema, first and second derivatives tests for local extrema. Concavity and inflection points. Curve sketching. Applied extrema problems. The Mean Value Theorem and applications.

Learning Outcome:

Upon successful completion of this course, a student should be able to:

1. Compute various types of limits of functions.
2. Apply the precise definition of a limit to some simple functions.
3. Determine the region of continuity and types of discontinuity of a function.
4. Apply the intermediate value theorem to locate zeros of functions.
5. Compute the slope of a curve at a point and the rate at which a function changes.
6. Calculate derivatives of different types of functions (exponential, logarithmic, trigonometric and inverse trigonometric functions) by using derivative rules.
7. Use differentials to estimate errors.
8. Differentiate the hyperbolic functions.
9. Find extreme values of functions.
10. Sketch and analyze the graphs of various types of functions.
11. Apply Newton's method to approximate zeros of functions.
12. Solve single variable optimization problems using derivatives.
13. Recover some basic functions from their derivatives.

The Course Grading Policy:

	Date	Time	Place	Materials	Percentage
Exam I (15 MCQ)	Sunday, 23 Feb.	6:00–7:30 pm		2.1 – 2.8	25% (75 pts)
Exam II (15 MCQ)	Sunday, 29 Mar.	6:30–8:00 pm		3.1 – 3.9	25% (75 pts)
Final Exam (21 MCQ)	Follow the registrar final schedule on his webpage.			Comprehensive	35% (105 pts)
Homework	The online homework is provided through BlackBoard.				5% (15 pts)
Class Work	<ul style="list-style-type: none">▪ It is based on quizzes, class tests, 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 x (out of 30) of the class work of all sections taught by the same instructor should be in the interval $[21, 22.5]$ (that is, $[70\%, 75\%]$ of the class work grade).				10% (30 pts)

The Course Passing Grade: A student must score at least 50% (150/300) to pass the course.

Upgrade Policy: The upgrade policy is applied when 3 points out of 300 are needed to get the next higher grade. For instance, the passing grade (D) starts at 150/300. If a student gets 148/300 or 149/300, then his grade will be automatically upgrade to D. However, if a student gets 147/300, his grade will be upgraded to D only if his final exam score is greater than or equal $105 \times 150 \div 300$ (that is, 52.5/105)

Exams:

Exam 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. 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

Missing an Exam:

Exam I or II: No make-up exam will be given under any circumstances. In case a student misses 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 of his performance in the non-missed exam and in the final exam.

Final Exam: If a student misses the final exam for a legitimate reason (such as medical emergencies), he will be given a make-up final exam.

Attendance: Students are expected to attend all lecture and recitation 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
 - 12 hours of unexcused absences in lecture and recitation classes.
 - 20 hours of excused and unexcused absences in lecture and recitation classes.

The absences will be counted as follow

	Hours
UTR Lectures	1 hour each
MW Lectures	1.5 hour each
Recitation	1 hour

(Note: the general rule for DN: 20% unexcused absences of the number of classes, and

33% excused and unexcused absences of the number of 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 your instructor.

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

The pace and material covered in the course

Week	Dates	Sec.	Topics
1	Jan. 19 – 23	2.1	The Tangent Problem (Example 1).
		2.2	The Limit of a Function.
2	Jan. 26 – 30	2.3	Calculating Limits Using the Limit Laws
		2.4	The Precise Definition of a Limit (Examples: 1, 2 and 3)
3	Feb. 2 – 6	2.5	Continuity
		2.6	Limits at Infinity; Horizontal Asymptotes
4	Feb. 9 – 13	2.7	Derivative and Rates of Change
		2.8	The Derivative as a Function + Exercise # 64
5	Feb. 16 – 20	2.8	Continued
		3.1	Derivatives of Polynomials and Exponential Functions
Exam I: Sunday, February 23, 2020 [2.1-2.8]			
6	Feb. 23 – 27	3.2	The Product and Quotient Rules
		3.3	Derivatives of Trigonometric Functions
7	March 1 – 5	3.4	The Chain Rule
		3.5	Implicit Differentiation + Exercise # 77
8	March 8 – 12	3.6	Derivatives of Logarithmic Functions
		3.7	Rates of Change (Example 1)
9	March 15 – 19	3.9	Related Rates
		3.10	Linear Approximations and Differentials
Exam II: Sunday, March 29, 2020 [3.1-3.9]			
10	March 22 – 26	3.10	Continued
		3.11	Hyperbolic Functions (Examples: 1 and 2)
11	March 29–April 2	4.1	Maximum and Minimum Values
		4.2	The Mean Value Theorem
12	April 5 – 9	4.3	How Derivatives Affect the Shape of a Graph
		4.4	Indeterminate Forms and L'Hospital's Rule
13	April 12 – 16	4.5	Summary of Curve Sketching
		4.7	Optimization Problems
14	April 19 – 23	4.7	Continued
		4.8	Newton's Method
15	April 26 – 30	4.9	Antiderivatives
			Review
Final Exam: Tuesday, May 5, 2020 (Comprehensive)			

Homework Assignments

Sec	Suggested Homework Problems	Recitation Problems	CAS*
2.2	6, 12, 18, 36, 40, 44	9, 11, 17, 35, 37, 39, 41	-
2.3	12, 18, 22, 24, 26, 32, 51, 54	1, 9, 11, 17, 21, 25, 29, 53	-
2.4	2, 14, 18, 22	3, 5, 13, 17, 21	-
2.5	6, 12, 16, 20, 24, 34, 36, 40, 42, 46	3, 7, 13, 15, 17, 19, 21, 23, 29, 31, 35, 43, 45, 47, 49	34
2.6	6, 10, 14, 18, 24, 28, 36, 42, 50	3, 7, 13, 15, 17, 19, 25, 35, 39, 41, 49	45
2.7	6, 10, 14, 22, 28, 36, 38	7, 9, 13, 21, 23, 25, 29, 35, 39	-
2.8	2, 4, 8, 24, 28, 50, 62	1, 3, 9, 25, 29, 41, 49, 61	55
3.1	10, 24, 38, 50, 56, 70, 72	9, 23, 35, 37, 49, 55, 59, 61, 69, 71, 73, 75, 81	47, 60
3.2	6,10, 20, 30, 32, 42, 46, 48, 52(d)	5, 9, 11, 23, 29, 31, 41,43, 49, 51, 53	38
3.3	6, 12, 22, 44, 52	3, 11, 23, 43, 49, 51	-
3.4	18, 26, 42, 50, 54, 62, 78	19, 25, 39, 53, 59, 61, 77	-
3.5	6, 14, 20, 22, 30, 58, 74(a), 78	7, 11, 15, 17, 21, 29, 57, 75, 77	-
3.6	12, 16, 18, 32, 34, 42, 48, 54	3, 9, 19, 31, 33, 41, 49, 53	-
3.7	2, 8	1, 3, 5, 9	-
3.9	4, 6, 12, 48	3, 7, 13, 19, 31	-
3.1	6, 16, 24, 28, 34	5, 17, 25, 27, 35	5
3.1	10, 20, 30, 46	7, 9, 21, 31, 57	-
4.1	10, 12, 28, 30, 34, 36, 42, 54	3, 5, 9, 11, 27, 33, 35, 39,55, 57	-
4.2	4, 8, 12, 16, 20, 26	3, 7, 9, 13, 15, 19, 25, 33	-
4.3	14, 18, 20, 24, 36, 52	11, 13, 17, 21, 23, 25, 31, 35, 57	62
4.4	12, 14, 48, 52, 64	13, 15, 23, 25, 33, 47, 53, 57, 87	72
4.5	30, 44, 62, 72	19, 33, 37, 63, 71	-
4.7	2, 6, 14, 32	3, 5, 15, 23, 29, 31	-
4.8	8, 12, 22	7, 11, 17	-
4.9	6, 12, 20, 38, 44, 54, 62	7, 15, 19, 35, 37, 41, 51, 59	-
<p>*: CAS problems require the use of a technology tool (e.g., graphing calculators or a computer). You are encouraged to do these problems in order to enhance your understanding of the concepts involved.</p>			

Tips on how to enhance your mathematical skills and achieve better grades:

1. First, consult your instructor immediately whenever you need help.
2. Take notes during classes and study your notes and textbook on the same day.
3. Do each homework assignment immediately.
4. Master the examples and homework problems of each section plus the recitation problems.
5. Try solving the recitation problems before coming to class.
6. When practicing some problems, time yourself to finish your solution before reading answers. That is, adapt yourself to the exam environment.
7. Solve some of the review problems at the end of each chapter.
8. Last and most important, study in the library.