

King Fahd University of Petroleum and Minerals
Department of Mathematics
Math101 Syllabus, Semester 261

Coordinator: Dr. Mohammed AbuShoshah (Abushosha@kfupm.edu.sa)

Title: Math 101

Credit: 4-0-4

Textbook: Calculus: Early Transcendental Functions, Metric Version, 7th edition, by Ron Larson and Bruce Edwards, Cengage Learning, Inc., 2019.

Objective: The objective of the course is to introduce students to the concepts of limits, continuity, differentiation, and their applications.

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

Prerequisite: One-year preparatory mathematics or equivalent.

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

1. Compute various types of limits of functions of one variable.
2. Determine the region of continuity and types of discontinuity of a function.
3. Compute the slope of the tangent line at a point.
4. Calculate derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential, logarithmic, hyperbolic, piecewise, and related functions.
5. Find extreme values, regions of monotonicity and concavity, asymptotes of a function of one variable.
6. Apply derivatives in estimating errors, approximating roots of equations via Newton's method and in solving optimization problems.
7. Recover some basic functions from their derivatives.

Grading Policy:	Date	Time	Duration	Place	Material	Weight
Exam I (14 MCQ)	September 28	TBA	90 min	Building 54	2.1 - 3.2 and 4.5	70 points
Exam II (14 MCQ)	November 2				3.3 - 4.2	70 points
Final (20 MCQ)	Registrar website	Registrar website	120 min	Building 54	Comprehensive	100 points
Rec. Lab (MATLAB)	Midterm Exam: 10 points and Final Exam: 20 points					30 points
Classwork	Based on quizzes, attendance, or any other class activities determined by the instructor. The classwork average (out of 30) for each section lies within the interval $[y - 1, y + 1]$, where $y = \frac{3}{20} \cdot [\text{Median}(E1)\% + \text{Median}(E2)\%]$					30 points
TOTAL						300 points

Letter Grades: Final letter grades will be assigned according to a grading curve, which will be determined based on the overall performance of all students enrolled in the course. The exact cutoffs may change from one term to another, depending on how the scores are distributed.

Exam Questions: Exam questions are related to the examples discussed in class, the assigned suggested problems, and the exercises in the textbook.

Examination Policies: You are expected to adhere to KFUPM policies for all examinations in this course, including quizzes, major exams, and final exams. The following policies are enacted in this course during examinations:

- Students are expected to arrive at the examination hall on time with proper University ID.
- Students are seated according to the instructor's seat assignment and may request a seat change only for legitimate reasons.
- Late arrival to the examination may result in denial of admission. Once a student has completed the examination and left the examination room, no late-arriving student will be admitted.
- Students are not permitted to leave the examination room to use the restroom during an exam, except in rare cases involving a documented medical condition (e.g., diabetes, kidney disease). Any excused restroom leave will be fully supervised by a same-gender proctor.
- Students must leave all smart devices outside the examination hall, including smartphones, smartwatches, earbuds, and unauthorized calculators. Possession of any unauthorized device will be considered a cheating attempt and will be handled accordingly.
- Cheating attempts will be reported according to KFUPM policy and will result in a DN grade in the course, along with potential further penalties upon investigation.

Missing an Exam: A student who misses Exam I, Exam II, or the Final Exam for a legitimate reason (e.g. medical) must submit an **official excuse** from the Deanship of Student Affairs **within seven calendar days** of the missed exam date. Failure to do so will result in a grade of zero for that exam. Upon acceptance of the excuse, the course coordinator will arrange a makeup exam.

Class Attendance: Students are expected to arrive on time for class, consistent with expectations in professional settings. Recording attendance for another student, signing another student's attendance, or asking another student to record yours will be reported for investigation and may result in severe consequences for both students involved.

A DN grade will be awarded, after two warnings, to students who exceed:

- **12 unexcused absences** from lectures and lab classes (one-fifth of the total number of classes), or
- **20 total absences** (excused and unexcused) from lectures and lab classes (one-third).

Use of Electronic Devices in Class: The use of mobile phones during class is not permitted. Students wishing to use electronic devices for note taking must obtain prior permission from the instructor. Failure to comply with this policy 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 Registrar's website.

Accessibility and Accommodations: Students with documented special needs, approved by the Deanship of Student Affairs, should contact the course coordinator to arrange reasonable accommodation

Honor code: Students of this course are expected to maintain the highest level of academic integrity and ethics. A KFUPM student does not cheat or tolerate those who do. Every student is expected to submit work that is entirely their own, to properly cite all sources used, and to refrain from any form of academic misconduct.

The Pacing Schedule:

Week	Date (2026)	Sec	Topic (24 sections)
1	Aug 19-20	2.1	Preview of Calculus (Tangent Line Problem)
2	Aug 23-27	2.2	Finding Limits Graphically and Numerically (Up to page 75) ⁽¹⁾ [Formal Definition of a Limit, $\epsilon - \delta$ definition, is Excluded]
		2.3	Evaluating Limits Analytically
3	Aug 30-Sep 3	2.3	continue
		2.5	Infinite Limits
4	Sep 6-10	4.5	Limits at Infinity
		2.4	Continuity and One-Sided Limits
5	Sep 13-17	3.1	The Derivative and the Tangent Line Problem
		3.2	Basic Differentiation Rules and Rates of Change
6	Sep 20-22	3.3	Product and Quotient Rules and Higher-Order Derivatives
	Sep 23-24	National Day	
↓ Exam I: September 28, 2026 [2.1-3.2 and 4.5] ↓			
7	Sep 27-Oct 1	3.4	The Chain Rule
		3.5	Implicit Differentiation + Normal Lines Exercises 63-64
8	Oct 4-8	3.6	Derivatives of Inverse Functions
		3.7	Related Rates
9	Oct 11-15	3.8	Newton's Method
		4.1	Extrema on an Interval
10	Oct 18-19	4.2	Rolle's Theorem and the Mean Value Theorem
	Oct 20-22	Midterm break	
11	Oct 25-29	4.2	continue
		4.3	Increasing and Decreasing Functions and the First Derivative Test
↓ Exam II: Nov 2, 2026 [3.3-4.2] ↓			
12	Nov 1-5	4.4	Concavity and the Second Derivative Test
		5.6	Indeterminate Forms and L'Hôpital's Rule
13	Nov 8-12	5.6	continue
		4.6	A Summary of Curve Sketching
14	Nov 15-19	4.7	Optimization Problems
		4.8	Differentials
15	Nov 22-23	Autumn break	
	Nov 24-26	5.1	Antiderivatives and integration
16	Nov 29-Dec 3	5.1	continue
		5.9	Hyperbolic Functions (Up to Example 3)
17	Dec 6-10	Review/ Catching up	
Final Exam (Comprehensive, MCQ): Date & Time to be announced by Registrar Office			

(1) Suggestion: One-Sided Limits, in Section 2.4, can be explained after Section 2.2

Suggested Practice Exercises:

sec	Suggested Practice Problems
2.1	4, 5, 7, 8
2.2	6, 11, 12, 14, 16, 21, 24, 26, 27, 29, 34, 71, 72
2.3	6, 10, 13, 18, 22, 23, 27, 34, 36, 40, 42, 45, 46, 50, 54, 55, 62, 67, 68, 72, 73, 89, 92, 95, 96, 100, 126
2.5	4, 5, 6, 8, 9, 10, 12, 13, 16, 17, 18, 22, 23, 24, 34, 35, 36, 38, 39, 43, 44, 56
4.5	12, 14, 16, 18, 20, 24, 26, 30, 34, 36, 40
2.4	6, 7, 10, 14, 15, 19, 21, 25, 28, 32, 35, 36, 38, 39, 41, 48, 50, 54, 56, 63, 75, 78, 81, 84, 89, 101, 103, 129
3.1	9, 10, 12, 14, 15, 20, 25, 27, 29, 32, 36, 40, 42, 44, 47, 53, 56, 60, 67, 78, 80, 88, 90, 97
3.2	6, 7, 10, 14, 19, 22, 25, 30, 32, 34, 41, 46, 50, 51, 54, 57, 60, 67, 69, 74, 96, 97, 100, 104, 107, 113, 117
3.3	5, 7, 11, 13, 21, 23, 25, 27, 35, 36, 43, 45, 56, 57, 58, 65, 71, 79, 85, 92
3.4	5, 7, 13, 15, 23, 26, 35, 37, 43, 46, 51, 53, 57, 65, 67, 73, 87, 95, 100, 102, 108, 115, 120, 124, 148, 154, 156, 176, 177
3.5	5, 7, 15, 17, 27, 29, 31, 33, 35, 39, 41, 43, 45, 47, 49, 55, 57, 59, 61, 63, 66, 71, 72, 85, 89, 95
3.6	3, 5, 15, 17, 19, 25, 27, 33, 35, 43, 45, 47, 52, 53, 60, 64, 67, 68, 69, 70, 73
3.7	3, 5, 7, 9, 13, 15, 17, 18, 19, 21, 23, 25, 27, 29, 35, 37, 42, 43, 45
3.8	3, 5, 7, 9, 11, 13, 15, 17, 20, 21, 24, 25, 27, 34, 37
4.1	5, 7, 10, 11, 13, 15, 17, 23, 25, 27, 34, 35, 45, 47, 51, 53, 57, 69, 72
4.2	8, 14, 16, 18, 42, 44, 48, 50, 54
4.3	6, 8, 12, 16, 20, 24, 30, 32, 38, 42, 44, 60, 62, 71, 76, 88, 105
4.4	4, 8, 10, 14, 16, 22, 24, 28, 30, 34, 38, 42, 44, 50, 54, 58
5.6	2, 3, 6, 8, 10, 18, 22, 30, 32, 43, 47, 48, 52, 55, 58, 63, 65, 69, 72, 79, 82, 103, 116
4.6	6, 12, 22, 26, 28, 34, 36, 38, 42, 44, 50, 52
4.7	6, 12, 14, 16, 18, 20, 22, 24, 26, 36
4.8	6, 8, 12, 18, 22, 26, 30, 38, 40, 48, 50
5.1	6, 10, 12, 14, 16, 20, 22, 26, 30, 34, 36, 38, 42, 44
5.9	15, 19, 23, 30, 35, 40, 44

Tips for Enhancing Your Problem-Solving Skills

- ✓ Solve all **suggested problems** carefully.
- ✓ Practice **additional problems** beyond those listed in the course materials. Focus on understanding methods rather than memorizing solutions.
- ✓ Attempt some **review exercises** at the end of each chapter.
- ✓ Try solving problems independently before reading solutions or seeking help.
- ✓ If you find a particular type of problem difficult, you should **practice more** of the same type until you gain confidence.
- ✓ Make effective use of your instructor's **office hours**. Bring your solution attempts and questions for discussion.

We wish you all the best.