

King Fahd University of Petroleum and Minerals
Department of Mathematics
Math101 Syllabus, Term 253 (2025-2026)

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.

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)	July 1 st	7:15 pm	90 min	Building 54	2.1 - 3.2 and 4.5	70 points
Exam II (14 MCQ)	July 16 th				3.3 - 4.2	70 points
Final Exam (20 MCQ)	Registrar website	Registrar website	120 min	TBA	Comprehensive	100 points
Rec. Lab (MATLAB)	Midterm Exam: 10 points + 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 determined by the overall performance of students enrolled in the course.

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

Cheating in Exams: Cheating, or any attempt to cheat through unauthorized activities, dishonest techniques, or fraudulent behavior, will result in a DN grade in the course and will be reported to the appropriate university authorities for further disciplinary action.

Cheating during exams includes, but is not limited to:

- Looking at another student's paper.
- Communicating with other students during the exam.
- Using mobile phones, smart watches, or any other electronic device

Exam Regulations

- Students **must present** a valid KFUPM ID, National/Iqama ID, Driver's License or any **valid identification card** to be admitted to the examination hall.
- Mobile phones, smart watches, and all electronic devices are **strictly prohibited** inside the examination hall. Possession or use of such devices during the exam will be considered an **attempt to cheat**.
- Students are required to sit in their **assigned seats**. Any violation of this requirement will be considered an attempt to cheat.

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), **an official excuse from Students Affairs** must be present. Otherwise, a zero grade will be assigned.

Attendance: Students are expected to attend all lectures and lab sessions.

- Students who miss a lecture or lab session are responsible for obtaining any information, announcements, or course materials presented during the missed class.
- After being warned twice, a DN grade will be awarded to students who accumulate more than
 - **10 unexcused absences** from lectures and lab classes. (20%), or
 - **16 total absences** (excused and unexcused) from lectures and lab classes (33.3%).

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.

The Pacing Schedule:

Week	Date (2026)	Sec	Topics (24 sections)
1	June 14-18	2.1	Preview of Calculus (Tangent Line Problem)
		2.2	Finding Limits Graphically and Numerically (Up to page 75) ⁽¹⁾ [Formal Definition of a Limit, ε-δ definition, is Excluded]
		2.3	Evaluating Limits Analytically
		2.5	Infinite Limits
2	June 21-25	4.5	Limits at Infinity
		2.4	Continuity and One-Sided Limits
		3.1	The Derivative and the Tangent Line Problem
3	June 28- July 02	3.2	Basic Differentiation Rules and Rates of Change
		3.3	Product and Quotient Rules and Higher-Order Derivatives
		3.4	The Chain Rule
Exam I: July 1, 2026 @ 7:15 pm, [2.1- 3.2 and 4.5]			
4	July 05-09	3.5	Implicit Differentiation + Normal Lines Exercises 63-64
		3.6	Derivatives of Inverse Functions
		3.7	Related Rates
		3.8	Newton’s Method
5	July 12-16	4.1	Extrema on an Interval
		4.2	Rolle’s Theorem and the Mean Value Theorem
		4.3	Increasing and Decreasing Functions and the First Derivative Test
Exam II: July 16, 2026 @ 7:15 pm, [3.3 - 4.2]			
6	July 19-23	4.4	Concavity and the Second Derivative Test
		5.6	Indeterminate Forms and L’Hôpital’s Rule
		4.6	A Summary of Curve Sketching
7	July 26-30	4.7	Optimization Problems
		4.8	Differentials
		5.1	Antiderivatives and integration
		5.9	Hyperbolic Functions and Their Derivatives and Antiderivatives (Up to Example 3)
8	August 2-3		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 Problems:

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.