

King Fahd University of Petroleum & Minerals

Department of Mathematics

MATH 341 Syllabus, Semester 261 (2026–2027)

Instructor / Coordinator: Dr. Dhaker Kroumi (dhaker.kroumi@kfupm.edu.sa)

Course Code & Title: MATH 341 — Real Analysis I

Course Credit Hours: 3-0-3

Textbook: Introduction to Real Analysis, by Robert G. Bartle and Donald R. Sherbert, 4th Edition, Wiley (2011).

Course Description: The real number system. Continuity and limits. Uniform continuity. Differentiability of functions of one variable. Definition, existence and properties of the Riemann integral. The fundamental theorem of calculus. Sequences and series of real numbers.

Prerequisite: MATH 210 or MATH 232 or ICS 253

Course Objectives: To provide a rigorous treatment of the foundations of single-variable analysis — the real number system, sequences, limits, continuity and uniform continuity, differentiation, the Riemann integral, and infinite series — and to develop the ability to read, construct, and communicate rigorous mathematical proofs.

Course Learning Outcomes: Upon the completion of the course, students should be able to:

- Identify different classes of real numbers.
- Apply the concepts of limit and continuity.
- Distinguish between the concepts of continuity and uniform continuity.
- Apply the properties of differentiation of functions of one variable.
- Compute Riemann sums and apply them to evaluate integrals.
- Interpret and apply the fundamental theorem of calculus.

Grading Policy:

	Date	Time	Place	Material	Points /300
Exam I	TBA	TBA	TBA	2.1 – 3.6	60 (20%)
Exam II	TBA	TBA	TBA	4.1 – 6.2	60 (20%)
Homework	—	—	—	—	45 (15%)
Quizzes + Attendance and participation	—	—	—	—	45 (15%)
Final Exam	As per Registrar			Comprehensive	90 (30%)
Total					300 (100%)

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 will be similar in style and level of difficulty to the examples and exercises provided in the textbook.

Examination Policies: You are expected to adhere to KFUPM policies for all examinations in this course, including quizzes, major exams, midterms, 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 exam may result in the student being denied admission. Once a student has completed the examination and left the examination hall/room, no late 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: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), the student must submit an official excuse approved by the Deanship of Student Affairs within seven calendar days of the missed exam date. Without an approved excuse, the student will receive a score of zero for the missed exam. When the excuse is accepted, the coordinator will arrange a makeup exam for the missed 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 given after two warnings if a student exceeds 9 unexcused absences (20% of the course) or exceeds a total of 15 absences, whether excused or not (one-third of the course).

Use of Mobile Devices in Class: The use of mobile phones during class is strictly prohibited. Students who wish to use laptops or tablets for notetaking must first obtain permission from the instructor. Any violation will result in a penalty determined by the instructor.

Academic Integrity: All KFUPM academic integrity policies apply to this course. For details, students should refer to the Undergraduate Bulletin available 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.

Plagiarism: Use of another person's ideas, processes, results, or words requires appropriate credit or reference to the author. Use of Generative AI tools is subject to the instructor's authorization. Submitting the same work in more than one course without the instructor's permission is not allowed.

Suggested Weekly Coverage Plan

Week	Date	Sec.	Titles
Week 1	Aug. 19 – 20	—	Course introduction and overview
Week 2	Aug. 23 – 27	2.1	Algebraic and Order Properties of $\mathbb{R}$
		2.2	Absolute Value and the Real Line
Week 3	Aug. 30 – Sep. 03	2.3	Completeness Property of $\mathbb{R}$
		2.4	Applications of the Supremum Property
Week 4	Sep. 06 – 10	3.1	Sequences and Their Limits
		3.2	Limit Theorems
Week 5	Sep. 13 – 17	3.3	Monotone Sequences
		3.4	Subsequences and the Bolzano–Weierstrass Theorem
Week 6	Sep. 20 – 22	3.5	Cauchy Criterion
		3.6	Properly Divergent Sequences
Sep. 23, 2026 – Sep. 24, 2026 : National Day Holiday			
Week 7	Sep. 27 – Oct. 01	4.1	Limits of Functions
		4.2	Limit Theorems ► Major Exam I — Material: 2.1–3.6
Week 8	Oct. 04 – 08	5.1	Continuous Functions
		5.2	Combinations of Continuous Functions
Week 9	Oct. 11 – 15	5.3	Continuous Functions on Intervals
		5.4	Uniform Continuity
Week 10	Oct. 18 – 19	5.6	Monotone and Inverse Functions
		6.1	The Derivative
Oct. 20, 2026 – Oct. 22, 2026 : Midterm Break			
Week 11	Oct. 25 – 29	6.2	The Mean Value Theorem
		6.3	L'Hospital's Rules
Week 12	Nov. 01 – 05	6.4	Taylor's Theorem
		7.1	The Riemann Integral ► Major Exam II — Material: 4.1–6.2
Week 13	Nov. 08 – 12	7.2	Riemann Integrable Functions
Week 14	Nov. 15 – 19	7.3	The Fundamental Theorem
Nov. 22, 2026 – Nov. 23, 2026 : Autumn Break			
Week 15	Nov. 24 – 26	9.1	Absolute Convergence
		9.2	Tests for Absolute Convergence
Week 16	Nov. 29 – Dec. 03	9.3	Tests for Nonabsolute Convergence
		9.4	Series of Functions
Week 17	Dec. 06 – 10	—	Review

Suggested Practice Problems

Problems refer to Bartle & Sherbert, *Introduction to Real Analysis*, 4th Edition.

Sec	Question Numbers
2.1	7, 8, 9, 10, 13, 17 (pp. 29–30)

Sec	Question Numbers
2.2	2, 4, 5, 7, 8, 12, 15 (p. 34)
2.3	1, 2, 3, 4, 5, 6, 9, 10 (p. 38)
2.4	1, 2, 4, 7, 12, 14, 18 (pp. 43–44)
3.1	1, 4, 5(a,c), 7, 8, 9, 10 (pp. 59–60)
3.2	1, 6, 7, 9, 12, 16, 17, 19, 20 (pp. 67–68)
3.3	1, 2, 6, 7, 9, 10, 11, 12 (pp. 74–75)
3.4	1, 2, 6, 7, 10, 11, 12, 14 (p. 80)
3.5	1, 2, 4, 5, 7, 9, 10, 12 (p. 86)
3.6	1, 2, 4, 7, 9, 10 (p. 88)
4.1	2, 3, 4, 6, 11, 12, 14 (p. 104)
4.2	1(a,b), 2, 4, 8, 11, 14 (pp. 110–111)
5.1	1, 2, 7, 8, 11, 12, 13, 15 (pp. 124–125)
5.2	2, 4, 6, 7, 8, 9, 10, 15 (pp. 128–129)
5.3	1, 2, 4, 8, 11, 13, 14, 17 (pp. 135–136)
5.4	1, 2, 4, 6, 9, 10, 12 (pp. 144–145)
5.6	1, 2, 3, 4, 5, 10 (pp. 155–156)
6.1	1, 2, 4, 7, 9, 10 (pp. 166–167)
6.2	1, 6, 7, 8, 10, 13, 14, 15, 19 (pp. 175–176)
6.3	1, 3, 5, 7, 8, 10 (pp. 182–183)
6.4	1, 4, 7, 11, 16, 18 (pp. 191–192)
7.1	1, 3, 13, 14, 16, 17 (pp. 201–202)
7.2	2, 8, 9, 10, 16, 17, 20 (pp. 208–210)
7.3	5, 6, 8, 10, 13, 14, 15, 17, 18, 21 (pp. 217–219)
9.1	1, 6, 7, 8, 9, 10, 11, 13 (pp. 256–257)
9.2	1, 3, 6, 8, 10, 11, 15, 17, 18 (pp. 262–263)
9.3	1, 2, 7, 8, 12, 14, 15 (pp. 265–266)
9.4	1, 2, 6, 9, 11, 12, 16, 17, 18 (pp. 272–273)