

King Fahd University of Petroleum & Minerals

Department of Mathematics

Math 102 Syllabus, Semester 261 (2026-2027)

Coordinator: Dr. Mohsen Alshahrani (mohseng@kfupm.edu.sa)

Course Code & Title: Math 102, Calculus II

Course Credit Hours: 4-0-4

Textbook: Larson, R. & Edwards, B., Calculus: Early Transcendental Functions, Metric Version, 7th edition, Cengage Learning, Inc., 2019.

Course Description: Definite and indefinite integrals of functions of a single variable. Fundamental Theorem of Calculus. Techniques of integration. Hyperbolic functions. Applications of the definite integral to area, volume, arc length and surface of revolution. Improper integrals. Sequences and series: convergence tests, integral, comparison, ratio and root tests. Alternating series. Absolute and conditional convergence. Power series. Taylor and Maclaurin series.

Prerequisite: Math 101.

Course Objective: The objective of the course is to introduce students to the concepts of integration, series, and their applications.

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

1. Estimate areas and definite integrals by Riemann sums.
2. Apply the Fundamental Theorem of Calculus.
3. Evaluate integrals using various techniques of integration.
4. Calculate the average value of a function, areas between curves, length of curves, volumes and surface areas of solids of revolutions.
5. Evaluate improper integrals and limits of sequences.
6. Apply convergence tests of series and evaluate sum of some selected convergent series.
7. Find interval and radius of convergence of a power series and express a function as a power series (Taylor and Maclaurin).

Grading Policy:

	Date	Time	Place	Material	Points /300
Exam I (14 MCQ)	Tuesday, Sep. 29	TBA	TBA	[5.2 – 7.1]	70 Points (23.33%)
Exam II (14 MCQ)	Tuesday, Nov. 3	TBA	TBA	[7.2 – 8.7]	70 Points (23.33%)
Final Exam (20 MCQ)	Registrar Website	Registrar Website	Registrar website	Comprehensive	100Points(33.34%)
Lab	Please see the syllabus of the Lab				30 Points (10%)
Class Work	- It is based on quizzes, class tests, or other class activities determined by the instructor. - The average (out of 30) of the class work of each section has to be in the interval $[y - 1, y + 1]$, where$y = \frac{3}{20}[\text{Median(Exam I)\%} + \text{Median(Exam II)\%}]$				30 Points (10%)
Total					300 Points (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 12 unexcused absences in lectures and labs (20% of the course) or exceeds a total of 20 absences in lectures and labs, 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 (2026)	Sec	Title
1	Aug. 19 – 20		Introductory class: Course Content, Grading Policy,...
		5.2	Area
2	Aug. 23 – 27	5.2	Continued
		5.3	Riemann Sums and Definite Integrals
3	Aug. 30 –Sep. 3	5.4	The Fundamental Theorem of Calculus+ Exercise # 114
		5.5	Integration by Substitution
4	Sep. 6 – 10	5.5	Continued
		5.7	The Natural Logarithmic Function: Integration
5	Sep. 13 – 17	5.8	Inverse Trigonometric Functions: Integration
		5.9	Hyperbolic Functions (Integration: Theorem 5.21)
6	Sep. 20 – 22	7.1	Area of a Region Between Two Curves
Wednesday - Thursday, September 23-24: National Day Holiday			
7	Sep. 27 – Oct. 1	7.2	Volume: The Disk Method
		7.3	Volume: The Shell Method
Exam I: Tuesday, September 29; Material: [5.2 – 7.1]			
8	Oct. 4 – 8	7.4	Arc Length and Surfaces of Revolution
		8.1	Basic Integration Rules
9	Oct. 11 – 15	8.2	Integration by Parts
		8.3	Trigonometric Integrals
10	Oct. 18-19	8.4	Trigonometric Substitution
Tuesday - Thursday, October 20-22: Mid-term break			
11	Oct. 25 – 29	8.5	Partial Fractions
		8.7	Rational Functions of Sine & Cosine (p. 569 only)

12	Nov. 1 – 5	8.8	Improper Integrals
		9.1	Sequences
Exam II: Tuesday, November 3; Material: [7.2 – 8.7]			
13	Nov. 8 – 12	9.2	Series and Convergence
		9.3	The Integral Test and p –Series
14	Nov. 15 – 19	9.4	Comparison of Series
		9.5	Alternating Series
Sunday - Monday, November 22-23: Autumn break			
15	Nov. 24 – 26	9.6	The Ratio and Root Tests
		9.7	Taylor Polynomials and Approx. (Up to Example 7)
16	Nov. 29 – Dec. 3	9.8	Power Series
		9.9	Representation of Functions by Power Series
17	Dec. 6 – 10	9.10	Taylor and Maclaurin Series; Binomial Series*
			Review/ Catching up, Dec. 10 is the Last Day of Classes
Final Exam : Comprehensive			

*: Students have to **memorize** the power series representations of the functions $f(x) = \frac{1}{1+x}$, e^x , $\sin x$, $\cos x$, $\arctan x$, $(1+x)^k$ in page 674.

Suggested Practice Exercises

Sr.	Sec	Exercises #
1	5.2	7, 15, 20, 27, 31, 37, 44, 55, 59, 67 (10 problems)
2	5.3	3, 10, 13, 17, 23, 35, 43, 48, 52, 66 (10 problems)
3	5.4	18, 21, 25, 40, 47, 55, 79, 86, 94, 112 (10 problems)
4	5.5	17, 22, 44, 48, 54, 60, 68, 79, 91, 94, 100 (11 problems)
5	5.7	14, 15, 28, 32, 33, 39, 47, 55, 70, 76, 83 (11 problems)
6	5.8	6, 14, 17, 19, 23, 33, 37, 44, 50, 66 (10 problems)
7	5.9	49, 54, 55, 60 (4 problems)
8	7.1	5, 10, 14, 18, 24, 38, 42, 52, 58, 61, 69, 82 (12 problems)
9	7.2	8, 11, 14, 19, 23, 32, 35, 38, 57, 73, 74 (11 problems)
10	7.3	11, 21, 25, 30, 45, 49, 59 (7 problems)
11	7.4	7, 14, 20, 37, 41, 46, 57, 60, 63, 71 (10 problems)
12	8.1	8, 22, 33, 46, 63, 72, 74, 84, 91, 94, 95, 98 (12 problems)
13	8.2	16, 22, 23, 28, 33, 50, 55, 63, 72, 86, 88(a, b, c), 99 (12 problems)
14	8.3	6, 10, 14, 25, 29, 45, 53, 58, 66, 72, 75 (11 problems)
15	8.4	19, 26, 28, 36, 41, 52, 54, 55, 66, 68 (10 problems)
16	8.5	3, 9, 13, 16, 24, 26, 31, 46, 47(a), 51 (10 problems)
17	8.7	55, 57, 60, 62 (4 problems)
18	8.8	7, 22, 27, 28, 38, 44, 47, 49, 67, 69, 70, 102 (12 problems)

19	9.1	9, 14, 20, 23, 31, 38, 44, 52, 55, 56, 61, 73 (12 problems)
20	9.2	8, 14, 20, 24, 36, 38, 41, 51, 58, 64, 81, 97 (12 problems)
21	9.3	4, 15, 24, 25, 33, 38, 45, 49, 66, 76, 77 (11 problems)
22	9.4	8, 9, 15, 25, 26, 30, 44, 51, 68, 70 (10 problems)
23	9.5	14, 15, 21, 26, 34, 37, 46, 49, 56, 63, 80, 81 (12 problems)
24	9.6	21, 30, 37, 44, 51, 61, 68, 78, 86 (9 problems)
25	9.7	11, 21, 24, 27, 30, 42, 67(a) (7 problems)
26	9.8	11, 20, 22, 25, 37, 40, 45, 51 (8 problems)
27	9.9	3, 7, 15, 18, 19, 22, 23, 38, 40, 47, 51 (11 problems)
28	9.10	6, 11, 14, 15, 25, 26, 33, 35, 43, 51, 53, 56, 58, 60, 68(evaluate only) (15 problems)

Note: Check also the **True-or-False** exercises in each section.

Some tips to enhance 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.