King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102 Syllabus, Term 233 (2023-2024)

Coordinator: Dr. Abdulaziz M. Alassaf (alassaf@kfupm.edu.sa)

Course Code and Title: Math 102, Calculus II

Credit: 4-0-4

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

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

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 Learning Outcomes: Upon successful completion of the course, a student 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	Percentage
Exam I (14 MCQ)	Thursday July 11, 2024	7:00 PM	Bld. 54	5.2- 7.2	23.33% (70)
Exam II (14 MCQ)	Sunday July28, 2024	7:00 PM	Bld. 54	7.3- 8.8	23.33% (70)
Final Exam (20 MCQ)	TBA	TBA	TBA	Comprehensive	33.33% (100)
Online Homework	On WebAssign (through Blackboard)				5% (15)
Recitation/Lab	Check with the recitation instructor				5% (15)
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 $y = \frac{(median(Exam\ I)\% + median(Exam\ II)\%) * 3}{20}$.				10% (30)
				Total	100% (300)

Letter Grades: The letter grades will follow a grading curve, which depends on the average of all students enrolled in the course.

Exam Questions: The questions of the exams are similar to the examples 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 for further action. Cheating in exams includes (but is not restricted to):

- Looking at the papers of other students.
- Talking to other students.
- Using mobiles, smart watches or any other electronic devices.

Other Exam Issues:

- No student will be allowed to take the exam if he/she does not bring his/her KFUPM ID, or National/Iqama ID, or Driver's License with him/her to the exam hall.
- Students are not allowed to have their mobiles, smart watches, or any electronic device in the exam hall. A violation of this will be considered an attempt of cheating.
- A student must sit in the seat assigned to him/her. A violation of this will be considered an attempt of cheating.

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), he/she must bring an official excuse from Students Affairs. Otherwise, he/she will get a score of zero in the missed exam.

Attendance: Students are expected to attend all lecture and lab classes.

- If a student misses a class/lab, he/she is responsible for any announcement made in that class/lab.
- After warned **twice** by the instructor, a DN grade will be awarded to any student who accumulates
    - 10 unexcused absences in lecture and lab classes.
    - 16 excused and unexcused absences in lecture and lab 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 the instructor.

Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin in the Registrar's website.

Pacing Schedule

Week	Date (2023)	Sec	Title
1	June 23 – June 27	5.2	Area
		5.3	Riemann Sums and Definite Integrals
		5.4	The Fundamental Theorem of Calculus+ **Exercise # 114**
		5.5	Integration by Substitution
2	June 30 – July 4	5.7	The Natural Logarithmic Function: Integration
		5.8	Inverse Trigonometric Functions: Integration
		5.9	Hyperbolic Functions (Integration: Theorem 5.21)
		7.1	Area of a Region Between Two Curves
Thursday July 11, 2024: First Major Exam (MCQ) [5.2 – 7.2]			
3	July 7 – July 11	7.2	Volume: The Disk Method
		7.3	Volume: The Shell Method
		7.4	Arc Length and Surfaces of Revolution
		8.1	Basic Integration Rules
4	July 14 – July 18	8.2	Integration by Parts
		8.3	Trigonometric Integrals
		8.4	Trigonometric Substitution
		8.5	Partial Fractions
5	July 21 – July 25	8.7	Rational Functions of Sine & Cosine (p. 569 only)
		8.8	Improper Integrals
		9.1	Sequences
		9.2	Series and Convergence
Sunday July 28, 2024: Second Major Exam (MCQ) [7.3 – 8.8]			
6	July 28 – Aug 1	9.3	The Integral Test and p −Series
		9.4	Comparison of Series
		9.5	Alternating Series
		9.6	The Ratio and Root Tests
7	Aug 4 – Aug 8	9.7	Taylor Polynomials and Approx. (Up to Example 7)
		9.8	Power Series
		9.9	Representation of Functions by Power Series
8	Aug 11 – Aug 12	9.10	Taylor and Maclaurin Series; Binomial Series*
		REVIEW & CATCH-UP, August 12, 2024 is the Last Day of Classes	

*: 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
2	5.3	3, 10, 13, 17, 23, 35, 43, 48, 52, 66
3	5.4	18, 21, 25, 40, 47, 55, 79, 86, 94, 112
4	5.5	17, 22, 44, 48, 54, 60, 68, 79, 91, 94, 100
5	5.7	14, 15, 28, 32, 33, 39, 47, 55, 70, 76, 83
6	5.8	6, 14, 17, 19, 23, 33, 37, 44, 50, 66
7	5.9	49, 54, 55, 60
8	7.1	5, 10, 14, 18, 24, 38, 42, 52, 58, 61, 69, 82
9	7.2	8, 11, 14, 19, 23, 32, 35, 38, 57, 73, 74
10	7.3	11, 21, 25, 30, 45, 49, 59
11	7.4	7, 14, 20, 37, 41, 46, 57, 60, 63, 71
12	8.1	8, 22, 33, 46, 63, 72, 74, 84, 91, 94, 95, 98
13	8.2	16, 22, 23, 28, 33, 50, 55, 63, 86, 88(a, b, c), 99
14	8.3	6, 10, 14, 25, 29, 45, 53, 58, 66, 72, 75
15	8.4	19, 26, 28, 36, 41, 52, 54, 55, 66, 68
16	8.5	3, 9, 13, 16, 24, 26, 31, 46, 47(a), 51
17	8.7	55, 57, 60, 62
18	8.8	7, 22, 27, 28, 38, 44, 47, 49, 67, 69, 70, 102
19	9.1	9, 14, 20, 23, 31, 38, 44, 52, 55, 56, 61, 73
20	9.2	8, 14, 20, 24, 36, 38, 41, 51, 58, 64, 81, 97
21	9.3	4, 15, 24, 25, 33, 38, 45, 49, 66, 76, 77
22	9.4	8, 9, 15, 25, 26, 30, 44, 51, 68, 70
23	9.5	14, 15, 21, 26, 34, 37, 46, 49, 56, 63, 80, 81
24	9.6	21, 30, 37, 44, 51, 61, 68, 78, 86
25	9.7	11, 21, 24, 27, 30, 42, 67(a)
26	9.8	11, 20, 22, 25, 37, 40, 45, 51
27	9.9	3, 7, 15, 18, 19, 22, 23, 38, 40, 47, 51
28	9.10	6, 11, 14, 15, 25, 26, 33, 35, 43, 51, 53, 56, 58, 60, 68(evaluate only)

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

Some tips to enhance your problem-solving skills:

- ❖ Do all homework assignments on time.
- ❖ Practice (but not memorize) more problems than those given in the above list.
- ❖ Solve some review exercises available at the end of each chapter.
- ❖ Solve the problems on your own before reading the solution or asking for help.
- ❖ If you find it difficult to handle a certain type of problems, you should try more problems of the same type.
- ❖ Try to make good use of the office hours of your instructor. Always bring your solution trials to discuss them with your instructor.