

**King Fahd University of Petroleum and Minerals**  
**Department of Mathematics & Statistics**  
**Math 101 – Syllabus**  
**2014-2015 (Term 143)**  
**Coordinator: Dr. Marwan Al-Momani**

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Calculus I (4 Credits)

**Instructor:** Dr. Mohammad Z. Abu-Sbeih

**Office:** Building 5, Room 401 and 309

**Email:** [abusbeih@kfupm.edu.sa](mailto:abusbeih@kfupm.edu.sa)

**Office Phone:** 3- 860 -2697 OR 2296

**Office Hours:** MWR : 9 :30 am to 10 :20 am.

**Class** 59-2018 UMTWR

**Textbook:** Thomas Calculus (Early Transcendentals) by G. Thomas, M. Weir and J. Hass. 12<sup>th</sup> edition, Pearson (2010).

**Description:** To introduce the student to basic concepts and methods of Calculus. Topics include: Limits, continuity and differentiability of functions of a single variable. Exponential, Logarithmic, trigonometric and inverse trigonometric functions. Applications: Related rates, Local linear approximation, Differentials, Curve sketching and Applied optimization problems. Area and Estimating with finite sums.

**Learning Outcome:**

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

1. Compute various types of limits of functions.
2. Apply the precise definition of a limit to some simple functions.
3. Determine the region of continuity and types of discontinuity of a function.
4. Apply the intermediate value theorem to locate zeros of functions.
5. Compute the slope of a curve at a point and the rate at which a function changes.
6. Calculate derivatives of different types of functions (Exponential, Logarithmic, trigonometric and inverse trigonometric functions) by using derivative rules.
7. Use differentials to estimate errors.
8. Find extreme values of functions.
9. Sketch and analyze the graphs of various types of functions.
10. Apply Newton's method to approximate zeros of functions.
11. Solve single variable optimization problems using derivatives.
12. Recover some basic functions from their derivatives.
13. Estimate the area of some regions in the plane.

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**Grading Policy:**

1. <b>Exam I</b> A common written exam	<b>Material:</b> 2.1-3.1	<b>Place:</b> Building 54	25% (100 points)
	<b>Date:</b> <b>Wednesday, June 24, 2015</b>	<b>Time:</b> 10:00pm-12:00am	
2. <b>Exam II</b> A common multiple choice exam	<b>Material:</b> 3.2-3.11	<b>Place:</b> Building 54	25% (100 points)
	<b>Date:</b> <b>Wednesday, July 29, 2015</b>	<b>Time:</b> <b>7:00-9:00pm</b>	
3. <b>Final Exam</b> A comprehensive common multiple choice exam	<b>Material:</b> Comprehensive	<b>Place:</b> Building 54	35% (140 points)
	<b>Date:</b> <b>Tuesday, August 11, 2015</b>	<b>Time:</b> <b>7:00-10:00 PM</b>	
4. <b>Class Work</b>	i) <b>Online Homework:</b> The web address for online homework is <a href="http://kfupm.mylabsplus.com">kfupm.mylabsplus.com</a>		5% (20 points)
	ii) <b>Class Activities:</b> It based on quizzes, class tests, or other class activities determined by the instructor. Any quiz or test under class activity should be of written type and not of multiple-choice type. The average $x$ (out of 40) of class activities of the sections taught by the same instructor must be in the interval $[24, 30]$ .		10% (40 points)

**Exam Questions:**

The questions of the common exams based on the examples, homework problems, recitation problems and the exercises of the textbook.

**Missing Exam I or Exam II:**

No makeup exam will be given under any circumstance. When a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula which depends on his performance in the non-missed exam and in the final exam.

**Attendance:**

Attendance is a University Requirement. A DN grade will be awarded to any student who accumulates 9 unexcused absences (lecture and recitation).

**Academic Integrity:** All KFUPM policies regarding ethics apply to this course.

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<b>Week</b>	<b>Date</b>	<b>Sec.</b>	<b>Topics (27 sections)</b>
1	June 07-11	2.1	Rates of Change and Tangents to Curves
		2.2	Limit of a Function and Limit Laws
		2.3	The Precise Definition of a Limit (Up to the end of Example 4)
2	June 14-18	2.4	One-Sided Limits
		2.5	Continuity
		2.6	Limits Involving infinity; Asymptotes of Graphs
3	June 21-25	3.1	Tangents and the Derivative at a point
		3.2	The Derivative as a function
		3.3	Differentiation Rules
		3.4	The Derivative as a Rate of Change
<b>Exam I: Material 2.1- 3.1; Wednesday, June 24, 2015.</b>			
4	June 28-July 2	3.5	Derivatives of Trigonometric Functions
		3.6	The Chain Rule
		3.7	Implicit Differentiation
		3.8	Derivatives of Inverse Functions and Logarithms
5	July 5-9	3.9	Inverse Trigonometric Functions
		3.1	Related Rules
		3.11	Linearization and Differentials
		4.1	Extreme Values of Functions
	July 12-23	Ramadhan Break	
6	July 26-30	4.2	The Mean Value Theorem
		4.3	Monotonic Functions and the first Derivative Test
		4.4	Concavity and Curve Sketching
		4.5	Indeterminate Forms and L' Hospital's Rule
<b>Exam II: Material 3.2- 3.11; Wednesday, July 29, 2015.</b>			
7	August 02-06	4.6	Applied Optimization
		4.7	Newton's Method
		4.8	Antiderivatives
8	August 9-11	5.1	Area and Estimating With Finite Sum
		5.2	Sigma Notation and Limits of Finite Sums
<b>Final Exam (Comprehensive): Tuesday, August 11, 2015; 07:00-10:00 PM.</b>			

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### Homework & Recitation Problems

Section	Homework Problems	Recitation Problems	CAS*
2.1	4, 10, 21	2, 8	18, 20
2.2	4, 8, 18, 32, 40, 47, 54, 60, 66, 71, 77, 79	3, 10, 28, 51, 65	68
2.3	10, 14, 16, 35, 38, 40	12, 13, 19, 37	-
2.4	4, 9, 16, 20, 28, 29, 34, 42	2, 5, 12, 24, 30	-
2.5	8, 15, 24, 26, 30, 37, 40, 48, 72, 77	6, 16, 29, 32, 78	51, 52
2.6	A: 2, 12, 20, 29, 34, 42 B: 50, 62, 67, 72, 76, 78, 86, 102	1, 11, 30, 57, 70, 84, 101	105, 108
3.1	2, 8, 18, 22, 23, 29, 40	16, 25, 33, 38	41, 46
3.2	2, 12, 15, 22, 24, 31, 38, 41, 46, 61	10, 16, 40, 48, 54	59, 65
3.3	8, 23, 31, 44, 47, 55, 60, 63, 67, 69	43, 56, 64, 70	66
3.4	4, 7	2, 8	33
3.5	9, 12, 24, 34, 38, 43, 54, 58, 59	21, 31, 50, 57	40, 69
3.6	6, 13, 30, 38, 53, 70, 72, 84, 86, 93	34, 50, 68, 78, 82	105
3.7	5, 13, 20, 27, 40, 42, 46	10, 22, 41, 47	53, 59
3.8	10, 18, 28, 30, 38, 51, 62, 64, 80, 90, 96	9, 24, 32, 54, 63, 76, 93	106
3.9	16, 24, 28, 34, 42, 56	14, 22, 25, 39	63
3.10	2, 10, 11, 19, 22, 25, 31, 33, 36	14, 23, 27, 44	-
3.11	A: 2, 6(a,d), 11, 15, 16 (e), 22, 24, 36, 38 B: 40, 47, 53, 54, 57	16 (d), 23, 43, 51, 59	64, 70
4.1	3, 8, 13, 20, 25, 51, 78	4, 9, 17, 38, 50	88, 96
4.2	3, 14, 22, 30, 38, 40, 49, 64	8, 26, 41, 66	59, 71
4.3	4, 13, 28, 40, 54, 63, 69(a), 74	44, 59, 64, 76	56, 71
4.4	7, 11, 25, 37, 49, 68, 81, 98, 115, 122	46, 82, 96, 118	123
4.5	10, 20, 32, 38, 57, 61, 64, 71, 79, 85	33, 50, 74, 80	84, 89
4.6	3, 6, 7, 11, 13, 16, 27, 30, 33, 67	4, 12, 28, 35	43, 67
4.7	2, 11, 25, 28	13, 21	18, 27(b)
4.8	8, 14, 20, 41, 66, 81, 88, 93, 112, 119(a-i)	16, 70, 79, 104, 113	129, 132
5.1	2, 7, 9, 17	8, 18	23
5.2	8, 12, 20, 32, 33, 43	31, 46	-

\* CAS problems require the use of a technology tool (e.g., graphing calculators or a computer). You are encouraged to do these problems in order to enhance your understanding of the concepts involved.

**Tips on how to enhance your problem-solving abilities:**

1. Please do all the homework assignments on time.
2. You are urged to practice (but not memorize) more problems than the above lists.
3. You should always try to solve a problem on your own before reading the solution or asking for help.
4. If you find it difficult to handle a certain type of problems, you should try more problems of that type.
5. You should try the recitation problems before coming to class.
6. You are encouraged to solve some of the review problems at the end of each chapter.
7. The practice you get doing homework and reviewing the class lectures and recitations will make exam problems easier to tackle.
8. Try to make good use of the office hours of your instructor.