King Abdulaziz University **Math 110 Syllabus** **Department of Mathematics**

First Semester 2009-10 **First Semester 1430-31**

Textbook: Thomas' Calculus, Eleven Editions (2008), Authors: Weir, Hass and Giordano

		Lectures				
Chapter Title	**Section Title**	**Subtitle**	**Examples**	**Exercises**	**HW**	**HW on line: Due date (end of)**
Chapter 1 Preliminaries	**1.1** Real Numbers and the Real Line	Real Numbers**,** Intervals, solving Inequalities, and Absolute Value.	1-6	4(a,c) ,41	5,7,11,15,17,18,25, 27,31,32,34,35,39, 42.	**7,15,31,35** **3rd Week**
	1.2 Lines, Circles, and Parabolas	Cartesian Coordinates in the Plane, Increments and Straight Lines, Parallel and Perpendicular Lines, Distance and Circles in the Plane, Parabolas	1-9	29, 33,37	7,8,9,13,29,34,39,4 5,51,57,61,65,73,77 ,80	**9,13,29,47,57** **3rd Week**
	1.3 Functions and Their Graphs	Functions; Domain and Range, Graphs of Functions, The Vertical Line Test, Piecewise-Defined Functions	1-3,5-6,8	9 ,28a,37	1-6,7,10,12,13,17, 18,20,21,25,29,39	**5,7,17,25,27** **3rd Week**
	1.4 Identifying Functions	Polynomial, and Rational Functions, Increasing Versus Decreasing Functions, Even and Odd Functions :Symmetry,	2	8,20,26	1-5,6,8,11,13,15, 17,20,23,25-29	**7,19,23** **3rd Week**
	1.5 Combining Functions; Shifting and Scaling Graphs	Sums, Differences, Products, and Quotients, Composite Functions, Shifting a Graph of a Function, Scaling and Reflecting a Graph of a Function	1-5	16,19,50	1-5,5,6,7,9,10, 11,13,14,15,17,18, 22,27,29,32,41,47, 49,51,55,60,63,69, 70-72,76,79	**1,15,19,51,71** **4th week**
	1.6 Trigonometric Functions	Radian Measure, The Six Basic Trig. Functions, Periodicity and Graphs of the Trig. Functions, Identities, The Law of Cosines,	1	5,8,15,31	6,7,11,13,18, 21,27,31,35,39,42, 43,47,49,56	**7,13,39,47** **4th Week**

		Lectures				
Chapter Title	**Section Title**	**Subtitle**	**Examples**	**Exercises**	**HW**	**Due date (end of)**
Chapter 2 Limits and Continuity	**2.1** Rates of Change and Limits	Average and Instantaneous Speed, Average Rates of Change and Secant Lines, Limits of Function Values	1-3,5-9	2 ,36	1,4,7-10,11,19,21-28 ,29,32,33,36,39	**1,3,** **5th Week**
	2.2 Calculating Limits Using the Limit Laws	The limit Laws, Eliminating Zero Denominators Algebraically, The Sandwich Theorem	1-6	51,55	1-3,17-33,35,36,38,40,43, 48,49,50,53,56-58	**17,27,31,49** **5th Week**
	2.4 One-Sided limits and Limits at Infinity	One-Sided Limits, Precise Definitions of One-Sided Limits, Limits Involving $\sin\theta/\theta$, Finite limits as $x \to \pm\infty$, Limits at Infinity of Rational Functions, Horizontal Asymptotes, The Sandwich Theorem Revisited	1-2,4-5, 7-11	5,9, 32	1-4,6,8,13,16,17,19, 21-36,39,43,45,47, 54,57,60,61, 63-69,70,79,80,84	**1,7,13,31,49** **6th Week**
	2.5 Infinite Limits and Vertical Asymptotes	Infinite limits, Vertical Asymptotes	1-3,5-7	18, 41	1,3,5,6,11,13,17,21,25,27, 29,33,37,40,42,43,45	**5,17,27,37** **6th Week**
	2.6 Continuity	Continuity at a point, Continuous Functions, Composites, Intermediate Value Theorem for Continuous Functions	1-9	2,11,19,32	1,3,4,5-10,12,13,18, 29-34,35,	**1,5,13,29,39** **6th Week**

		Lectures				
Chapter Title	**Section Title**	**Subtitle**	**Examples**	**Exercises**	**HW**	**Due date (end of)**
Chapter 3 Differentiation	**3.1** The Derivative as a Function	Calculating Derivatives from the definition, Notation, Graphing the Derivative, Differentiable on an Interval; One-Sided Derivatives, When Does a Function Not Have a Derivative at a Point, Differentiable Functions Are Continuous, The Intermediate Value Property of Derivative	1-3,5-6	20,24,28	1,6,7,13,14,20,25,27-30, 31-34,35,37,40,42,44, 45	**1,7,13,25,27, 41** **7th Week**
	3.2 Differentiation Rules	Powers, Multiples, Sums, and Differences, Products and Quotients, Negative Integer Powers of x, Second-and Higher Derivatives	1-14 No proofs		1-12(odd) ,17-28(odd) ,29,31,41,43,45	**1,11,13,17,41** **8th Week**
	3.4 Derivatives of Trigonometric Functions	Derivative of the Sine Function, Derivative of the Cosine Function, Simple Harmonic Motion, Derivatives of the Other Basic Trigonometric Functions	1-7	30,38, 49	1-11(odd),13,17,27,37, 49	**9,13,37,49** **8th Week**
	3.5 The Chain Rule and Parametric Equations	Derivative of a Composite Function, ”Outside-Inside” Rule, Repeated Use of the Chain Rule, The Chain Rule with Powers of a Function,	1-8		1,3,5,9,15,21,23,27,33, 37,45,47,49,51,55,59	**3,11,15,37, 49** **9th Week**
	3.6 Implicit Differentiation	Implicitly Defined Functions, Lenses, Tangents, and Normal Lines, Derivatives of Higher Order, Rational Powers of Differentiable Functions,	1-7	31,57,61	1-9(odd),19-35(odd), 39,43,45,51	**9,25,33,45** **9th Week**

		Lectures				
Chapter Title	**Section Title**	**Subtitle**	**Examples**	**Exercises**	**HW**	**Due date (end of)**
Chapter 4 Applications of Derivatives	**4.1** Extreme Values of Functions	Local Extreme Values, Finding Extrema	1-4	25,45	1-14,15,17,23,27,29,31, 34,45,49,52,53,54,55,58 ,65-69	**1,5,15,45, 51** **11th Week**
	4.2 The Mean Value Theorem	Rolle's Theorem, The Mean Value Theorem, A Physical Interpretation, Mathematical Consequences, Finding Velocity and Position from Acceleration	1-5	38,42,45	1,4,6,8,9,10,12,15,22,23 ,25, 27-36,37,44	**1,4,27,37, 41** **11th Week**
	4.3 Monotonic Functions and The First Derivative Test	Increasing Functions and Decreasing Function, First Derivative Test for Local Extrema	1-2	2 ,16,21	1,2-8,10-17,21,23, 24-28,29,35,37,39,42, 43-46	**1,7,11,29** **11th Week**
	4.4 Concavity and Curve Sketching	Concavity, Points of Inflection, Second Derivative Test for Local Extrema, Learning About Functions from Derivatives	1-7	1, 23,37	2-8,10-17,21,24,25,32, 38,40,44,46,49,51,54,57 ,60,63-70,75,79,80	**1,17,23,45** **12th Week**
	4.6 Indeterminate Forms and L'Hopital's Rule	Indeterminate Form $0/0$, Indeterminate Form $\infty/\infty, \infty.0, \infty-\infty$	1-7		1-5,7-34	**1,5,7,9,11, 15,19,23** **13th Week**
	4.8 Antderivatives	Finding Antderivatives, Antderivatives and Motion, Indefinite Integrals,	1-4,6-7	26,37,53	1-6,17-25,27-36,38-52, 54,55,59,62,65-66, 101-102	**1,15,23,47, 49** **13th Week**

Note:

1. **All examples and exercises in the lectures part must be solved by the instructor.**
2. **All the exams are Multiple Choice (MC).**
3. **Homework should be submitted online on or before the due date**
4. **Any student who misses 25% of the class will receive DN.**

Marks distribution

1. **First Exam (75 Min; 30 Marks); Second Exam (75 Min; 30 Marks); Final Exam (120 Min; 40 Marks)**
2. **Bonus Marks will be given to students who submit all the HW online.**