King Abdulaziz University **Math 203 Syllabus** **Department of Mathematics**

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

Textbook: Thomas' Calculus, Eleventh Edition (2008), Authors: Weir, Hass and Giordano

		Lectures				
Chapter Title	**Section Title**	**Subtitle**	**Examples**	**Exercises**	**HW**	**HW on line: Due date (end of)**
Chapter 10 ***Conic Sections and Polar Coordinates***	**10.1** Conic Sections and Quadratic equations	Parabolas, Ellipses, Hyperbolas, Shifting conic sections (Page 694), Inequalities (Page 695)	1,2, 3, 4, 5	40, 42, 44, 58, 70	1, 3, 9, 11, 13, 15, 17, 19, 25, 31, 33, 35, 37, 39, 41, 43, 57, 59, 71	**45, 49, 51, 53, 59, 63** **3rd Week**
	10.2 Classifying Conic Sections by Eccentricity	Eccentricity of Ellipse, Hyperbola, Parabola	2, 3, 4	2, 10, 12, 14, 27, 37	1, 3, 7, ,9, 11, 15, 31, 33	**19, 25, 35, 39** **3rd Week**
	10.3 Quadratic Equations and Rotations	Equations (1), (4), (5), (6), (7), The Discriminant Test	1, 2, 3		1, 3, 5, 7, 15, 19	**23, 25** **3rd Week**
	10.4 Conics and Parametric Equations; The Cycloid	Parabolas and Hyperbolas, Cycloids	1, 2, 3		3, 5, 7	**9, 11** **4th Week**
	10.5 Polar Coordinates	Definition of Polar coordinates, Polar Equations and Graphs, Relating polar and Cartesian Coordinates	1,2, 3, 4, 5, 6		3, 6 (a-d, f), 7, 9, 11, 21, 23, 27, 31, 35, 51	**41, 43, 53, 55, 59** **4th Week week**
	10.6 Graphing in Polar coordinates	Symmetry Tests for Polar Graphs, Slope	1, 2, 4, 5	18	1, 3, 5, 7, 17, 19, 29	**31, 33, 37** **4th Week**
	10.7 Areas and Lengths in Polar coordinates	Area in the plane, Length of a polar Curve, Area of a Surface of Revolution	1,2, 3, 4, 5		3, 9, 13, 19	**21, 23, 29** **5th Week**

	10.8 Conic Sections in polar Coordinates	Lines, Circles, Polar Equations for Lines and Circles, Polar Equation for a Conic with Eccentricity	1, 2, 3, 4, 5		5, 9, 11, 17, 21, 31, 33, 35	**27, 29, 37, 39, 41, 43** **5th Week**
Chapter 12 ***Vectors and the Geometry of Space***	**12.1** Three-Dimensional Coordinate Systems	Distance and Spheres in Space	1, 2, 3, 4, 5	11, 25, 27, 53, 54, 56	1, 3, 5, 7, 9, 13, 15, 17, 19, 21, 29, 33, 35, 39, 41, 45, 51	**31, 43, 49, 55** **5th Week**
	12.2 Vectors	Component Form, Vector Algebra Operations, Unit Vectors, Midpoint of a Line Segment	1, 3, 5, 6, 7, 8	14, 39	5, 7, 9, 13, 17, 21, 25, 31, 33, 37	**15, 27, 39, 41** **6th Week**
	12.3 The Dot Product	Angle Between Vectors, Perpendicular (Orthogonal) Vectors, Dot Product Properties and Vector projections, writing Vectors as a Sum of Orthogonal Vectors, Direction Angles and Direction Cosines (Q 15)	1, 2, 3, 4, 5, 6	29, 33, 34, 35, 47	1, 3, 7, 11,	**37, 49, 51** **6th Week**
	12.4 The Cross Product	The Cross Product of Two Vectors in Space, Triple Scalar or Box Product	1, 2, 3, 4, 6	11, 24, 33, 34	1, 3, 7, 9, 13, 15, 17, 19, 21, 23, 27, 31, 35, 37	**29, 39, 41, 43** **6th Week**
	12.5 Lines and Planes in Space	Line and Line Segments in Space, The Distance from a Point to a Line in Space, An Equation for a Plane in Space, The Distance from a Point to a Plane, Angle Between Planes	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12	28, 46, 62, 71	1, 3, 5, 7, 9, 15, 17, 21, 23, 25, 27, 29, 31, 35, 41, 45, 47, 53, 61	**55, 59, 65, 67** **7th Week**
	12.6 Cylinders and Quadric Surfaces	Cylinders, Quadric Surfaces	1, 2, 3, 4, 5, 6, 7	65, 68	3, 7, 15, 17, 21, 27, 29, 31, 33, 35, 37	**41, 59, 69** **7th Week**
Chapter 13 ***Vector-Valued Functions and Motion in Space***	**13.1** Vector Functions	Limit and Continuity, Derivatives and Motion, Differentiation Rules, Vector Functions of Constant Length, Integrals of Vector Functions, Formulas 7-8 (Q46)	1, 2, 3, 4, 5, 6, 7	6, 9, 20, 28, 34	1, 3, 5, 11, 13, 15, 19, 21, 27, 31, 33	**25, 29, 35, 47** **7th Week**
	13.2 Modeling Projectile Motion	The vector and Parametric Equations for Ideal Projection Motion; Height, Flight Time, and Range; Firing from (x_0, y_0)	1	2	1	3 **8th Week**
	13.3 Arc Length and the Unit Tangent Vector **T**	Arc Length as a Space Curve, Speed on a Smooth Curve, Unit Tangent Vector **T**	1, 2, 3, 4	10	1, 3, 5, 9	**7, 13, 15** **8th Week**

	13.4 Curvature and the Unit Normal Vector **N**	Curvature of a Plane Curve, Circle of Curvature for Plane Curves, Curvature and Normal Vectors for Space Curves	1, 2, 3, 4, 5, 6		1, 3, 9, 13	**5(a,b), 11** **8th Week**
	13.5 Torsion and the Unit Binormal Vector **B**	Torsion, Tangential and Normal Components of Acceleration, Formulas 4, 5 and 6	1, 2		1, 5, 9, 11	**7, 13** **9th Week**
	13.6 Planetary Motion and Satellites	Motion in Plane and Cylindrical Coordinates, Planets Move in Planes, Kepler's First, second, and Third Laws (Statements only)				
Chapter 14 ***Partial Derivatives***	**14.1** Functions of Several Variables	Functions of Two Variables; Graphs, Level Curves, and Contours of Functions of Two Variables; Functions of Three Variables	1, 2, 3, 4, 5	8, 10, 30	1, 3, 5, 7, 9, 19, 23, 33, 41	**11, 31, 39** **9th Week**
	14.2 Limits and Continuity in Higher Dimensions	Limits, Theorem 1, Continuity, Functions of More Than Two Variables	1, 2, 3, 4, 5	20, 30, 42, 56, 61	1, 7, 13, 15, 21, 27, 31, 37, 39, 41, 51	**17, 53, 59** **9th Week**
	14.3 Partial Derivatives	Partial Derivatives of a Function of Two Variables, Calculations, Functions of More Than Two Variables, Partial Derivatives and Continuity, Second-Order Partial Derivatives, The Mixed Derivative Theorem, Differentiability, Corollary of Theorem 3, Theorem 4	1, 2, 3, 4, 5, 6, 8, 9, 10	58, 68, 70	3, 7, 9, 11, 19, 21, 25, 31, 43, 53, 57, 63, 65, 69, 71, 73	**37, 39, 49, 54, 67, 75** **10th Week**
	14.4 The Chain Rule	Functions of Two Variables, Theorem 5, Functions of Three Variables, Theorem 6, Functions Defined on Surfaces, Theorem 7, Implicit Differentiation Revisited: Theorem 8, Functions of Many Variables, Three-Variable Implicit Differentiation (Page 1004)	1, 2, 3, 4, 5	30, 34, 42, 49	3, 5, 7, 11, 13, 15, 17, 23, 25, 29, 33, 35, 41, 43	**9, 21, 27, 31** **10th Week**
	14.5 Directional Derivatives and Gradient Vectors	Definition 1, Interpretation of the Directional Derivatives, Calculation and Gradients, Theorem 9, Properties of the Directional Derivative, Gradients and Tangents to Level Curves, Algebra Rules for Gradients, Functions of Three Variables	1, 2, 3, 4, 5, 6	27, 29	1, 3, 5, 11, 13, 17, 19, 23, 28	**15, 21, 25** **11th Week**
	14.6 Tangent Planes and Differentials	Tangent Planes and Normal Lines, Equations (2, 3, 4), Estimating Change in a Specified Direction, How to Linearize a Function of Two Variables (Equation 5), Differentials, Functions of More Than Two Variables	1, 2, 3, 4, 5, 7, 10		1, 3, 5, 9, 15, 17, 19, 25, 27, 37, 39, 47	**8, 11, 29, 49, 63** **11th Week**

	14.7 Extreme Values and Saddle Points	Derivative Tests for local Extreme Values, Theorem 10, Theorem 11, Absolute Maxima and Minima on Closed bounded regions	1, 2, 3, 4, 5	26, 29	1, 3, 7, 9, 17, 19, 25, 29, 31, 43	**27, 33** **12th Week**
	14.8 Lagrange Multipliers	Constrained Maxima and Minima, The method of Lagrange Multipliers (Equations (1))	1, 3, 4	18	1, 3, 5, 13, 19	**7, 21** **12th Week**
	14.9 Partial Derivatives with Constrained Variables	How to find $\partial w/\partial x$ When the Variables in $w = f(x, y, z)$ Are Constrained by Another Equation, Notation	1, 2, 3	5, 10	7	1 **13th Week**
	14.10 Taylor's Formula for Two Variables	Taylor's Formulas (7) and (8)	1	2	1, 3	**9** **13th Week**

Note:

1. **All examples and exercises in the lectures part must be solved by the instructor.**
2. **Every Exam will contain at least 25% multiple choice (MC) questions.**
3. **Homework should be submitted online on or before the due date**

Marks distribution

1. **First Exam (75 Min; 25 Marks); Second Exam (75 Min; 25 Marks); Final Exam (120 Min; 40 Marks)**
2. **Homework (10 Marks)**