



King Abdul-Aziz University

Academic Year: 1440 – 1441H

Mathematics Department

(2019 – 2020M)

**MATH - 463: COURSE SYLLABUS**

**Book: Differential Geometry, Schaum's outline series by: Lipschutz (1969).**

Chapter Title	Sections And Topics	Number of Lectures (50 min)	Examples	Solved Problems	Supplementary Problems	H. W.
<b>Chapter 3: Concept of a Curve</b>	3.1. Regular Representations	2	1, 2, 3	3.1, 3.2, 3.3, 3.6		3.26
	3.2. Regular Curves	1	6, 7, 9			
	3.3. Orthogonal Projections	2	10		3.25	
	3.4. Implicit Representations of Curves		11		3.27	
	3.5. Regular Curves of Class $C^m$			3.9, 3.10	3.30	3.34
	3.6. Arc Length as a Parameter	3	Th3.3, 3.16, 3.17	3.15, 3.16, 3.17, 3.18	3.32	
<b>Chapter 4: Curvature and Torsion</b>	4.1. Unit Tangent Vector	2	1			
	4.2. Tangent Line and Normal Plane		2	4.1, 4.2	4.26, 4.27, 4.28	
	4.3. Curvature	3	3, 4, Th4.1, Th4.2	4.5, 4.7, 4.8,	4.31, 4.32, 4.35	4.30
	4.4. Principal Normal Unit Vector	2	5			
	4.5. Principal Normal Line and Osculating Plane		7			
	4.6. Binormal and Moving Trihedron	2	8	4.11, 4.12, 4.13		
	4.7. Torsion, General Helix	4	9, Th4.4, Th4.5	4.3, 4.4, 4.6, 4.16, 4.17, 4.18, 4.19, 4.21	4.33, 4.34, 4.38	4.32, 4.39
	4.8. Spherical Indicatrix	3	10	4.23, 4.24, 4.25	4.42, 4.43	4.40, 4.41

<b>Chapter 5:</b>	<b>5.1. Frenet Equations</b>					<b>5.32</b>
<b>The Theory of Curves</b>	<b>5.2. Intrinsic Equations</b>		<b>1</b>	<b>5.1, 5.3</b>	<b>5.25, 5.28</b>	<b>5.33</b>
	<b>5.3. Special Curves (Involutives, Evolutes, Bertrand)</b>	<b>6</b>	<b>5, 6</b>	<b>5.8, 5.14, 5.15, 5.16</b>		<b>5.35</b>
<b>Chapter 8:</b>	<b>8.1. Regular parametric Representation, coordinate patch</b>	<b>4</b>	<b>1{a,b}</b> <b>2{a}</b> <b>3</b>	<b>8.1, 8.2, 8.7, 8.8, 8.11</b>	<b>8.24</b>	<b>8.26</b>
<b>Concept of a Surface</b>	<b>8.2. Tangent plane and Normal Line</b>	<b>3</b>	<b>4, 5</b>	<b>8.17, 8.18,</b>	<b>8.30, 8.31</b>	
<b>Chapter 9:</b> <b>First and Second Fundamental Forms</b>	<b>9.1. First Fundamental Form</b>		<b>1</b>	<b>9.1</b>		
	<b>9.2. Arc Length and Surface Area</b>	<b>3</b>	<b>2, 3, Th9.1</b>	<b>9.2, 9.3</b>	<b>9.36, 9.37</b>	
	<b>9.3. Second Fundamental Form</b>	<b>3</b>	<b>4, 5, 6, 7,8, 9{a,b} Th 9.6, Th9.7</b>	<b>9.7, 9.9</b>		
	<b>9.4 Gaussian and mean curvature</b>	<b>2</b>	<b>10</b>	<b>9.12</b>	<b>9.44, 9.45</b>	
	<b>9.5. Problems</b>	<b>2</b>			<b>9.34, 9.36, 9.37</b>	<b>9.35</b>

<b>Exams</b>	<b>First Exam</b>	<b>Second Exam</b>	<b>Final Exam</b>
<b>Time</b>	<b>60 min</b>	<b>60 min</b>	<b>120 min</b>
<b>Marks</b>	<b>30 marks</b>	<b>30 marks</b>	<b>40 marks</b>

**Note:** Home work exercise must be solved by the students