



Arab Academy for Science & Technology and Maritime Transport
College of Engineering & Technology
Department of Basic and Applied Science
Smart Village Campus

BA223

Mathematics (3)

Fall 2013-2014

Course Outline

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Prerequisite:	Mathematics (2) BA124
Course Aim	<ul style="list-style-type: none"> • Introduce students to differential equations which arise as a mathematical modeling in many topics of Engineering. • Introduce students to Laplace Transforms and Fourier series.
Course Objectives	<p>Upon Completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • Solve first and second order ordinary differential equations. • Find the Laplace and Inverse Laplace transforms for the functions in time and frequency domains (if they exist). • Solving differential equations by means of Laplace transform. • Obtain the Fourier series for the periodic functions. <p>All of these topics are of fundamental importance in modern Engineering and Science.</p>
Text Book	Advanced Engineering Mathematics, Dennis G.Zill and Warren S.Wright Fourth Edition-Mc-Graw Hill
Reference	Advanced Engineering Mathematics, Erwin Kreyszig, Ninth Edition - Mc-Graw Hill
Course Outcomes	An ability to apply knowledge of mathematics, science, and engineering
Grading Policy	<p>Assignments and attendance: 10 Marks</p> <p>Week 4: Quiz (5Marks) Tutorial Week 5: Quiz (5Marks) Lecture Week 6: Quiz (5Marks) Tutorial Week 7: Exam (15Marks) Lecture Week 9: Quiz (5Marks) Tutorial Week 10: Quiz (5Marks) Lecture Week 12: Exam (10Marks) Lecture Week 16: Final Exam (40Marks)</p>

Week of		E V E N T	
1	Sept.22 nd	Lecture	<i>Ch.1:First order ordinary differential equations: Separable equations - Initial value problems- Homogeneous equations</i> Problems : Ex 2.2 Page 45 #1, 3,21 Sheet (1) # 1,2,3 - Sheet (2) # 1,2,3,9
		Tutorial	Problems : Ex 2.2 Page 45 # 8, 14,22 Sheet (1) # 4,5,6,11 - Sheet (2) # 4,6,7,8
		H.W	Problems : Ex 2.2 Page 45 #2,7,11,13 Sheet (1) # 7,8,9,10,12,13 - Sheet (2) # 5,10,11
2	Sept.29 th	Lecture	<i>Total differential and Exact equations - Linear equations</i> Problems : Ex 2.3 Page 53 #13,14,18,31 - Ex 2.4 Page 59 #4,8,9 Sheet (3) # 1,4,9 - Sheet (4) # 1,3,4,5
		Tutorial	Problems : Ex 2.3 Page 53 #19,21,23 - Ex 2.4 Page 59 #10,12,15 Sheet (3) # 7,12,14 - Sheet (4) # 2,6,8
		H.W	Problems : Ex 2.3 Page 53 #3,4,17,32 - Ex 2.4 Page 59 #5,7,17 Sheet (3) # 2,3,5,6,8,10,11,13 - Sheet (4) # 7,9,10,11,12
3	Oct.6 th	Lecture	<i>Bernoulli's equation- Revision on Ch.1</i> Problems : Ex 2.5 Page 64 #15,16,17 Sheet (5) # 1,3,5 - Sheet (6) # 1,2,5,14
		Tutorial	Problems : Ex 2.5 Page 64 #18,21 Sheet (5) # 2,4,6,7 - Sheet (6) # 3,4,8,15
		H.W	Problems : Ex 2.5 Page 64 #19,20 Sheet (5) # 8,9,10 - Sheet (6) # 6,7,9-13,16 Sheet (7): All problems
4	Oct.20 th	Lecture	<i>Ch.2: Second order ordinary differential equations with constant coefficients: Fundamental set of solutions- Linear independence of solutions: Wronskian- General solution of homogeneous equations</i> Problems : Ex 3.3 Page 117 #1-10(odd),16 Sheet (8) # 1,3,5 - Sheet (9) # 1-5
		Tutorial	Problems : Ex 3.3 Page 117 #1-10 (even), 15 Sheet (8) #8 - Sheet (9) # 6-12+Quiz No.1
		H.W	Problems : Ex 3.3 Page 117 #11-14,17 Sheet (9) 13-19
5	Oct.27 th	Lecture	<i>Non-homogeneous equations: (Method of undetermined coefficients) +Quiz No.2</i> Problems : Ex 3.4 Page 127 #1,3,5 Sheet (10) # 1-7
		Tutorial	Problems : Ex 3.4 Page 127 #2,4,8 Sheet (10) # 20-26
		H.W	Problems : Ex 3.4 Page 127 #37,38 Sheet (10) # 39-45

6	Nov.3 rd	Lecture	<i>Non-homogenous equations</i> <i>Method of undetermined coefficients (Case of duplication)</i> <i>The Method of variation of parameters</i> Problems : Ex 3.4 Page 127 #10,11 Sheet (10) # 8-11, 15-19 - Sheet (11) # 1-5,10
		Tutorial	Problems : Ex 3.4 Page 127 #12,21+ Quiz No.3 Sheet (10) # 27-30,34-38 - Sheet (11) #6-9,16
		H.W	Problems : Ex 3.4 Page 127 #29,31 Sheet (10) # 46-49, 53-57 - Sheet (11) # 11-15
7	Nov.10 th	Lecture	<i>Second order ordinary differential equations with variable coefficients: [Cauchy -Euler Equation] + 7th week exam</i> Problems : Ex 3.6 Page 138 #11,19,21 Sheet (12) # 1,2,4,5
		Tutorial	Problems : Ex 3.6 Page 138 #20,23 Sheet (12) # 3,6,8,10
		H.W	Problems : Ex 3.6 Page 138 #10,30 Sheet (12) # 7,9,11-14 - Sheet (13): All problems
8	Nov.17 th	Lecture	<i>CH.3: Laplace transforms: Basic definition</i> <i>First Shifting Theorem (s-shifting)</i> Problems : Ex 4.1 Page 201 #19-36 (odd) Sheet (14) # 1-17
		Tutorial	Problems : Ex 4.1 Page 201 #19-36 (even) Sheet (14) # 53-66
		H.W	Problems : Ex 4.1 Page 201 #37-40 Sheet (14) # 101-115
9	Nov.24 th	Lecture	<i>Laplace transforms: Derivatives of Transforms</i> <i>Transform Integration</i> Problems : Ex 4.3 Page 217 #1-9 (odd) Ex 4.4 Page 228 #1-8 (odd) – 23-30 (odd) Sheet (14) # 18-35
		Tutorial	Problems : Ex 4.3 Page 217 #1-9 (even) Ex 4.4 Page 228 #1-8 (odd) – 23-30 (odd) Sheet (14) # 67-84 + Quiz No.4
		H.W	Problems : Ex 4.3 Page 217 #10 Sheet (14) # 116-135
10	Dec.1 st	Lecture	<i>Unit Step Function- Second Shifting Theorem (t-shifting) - Convolution Theorem+ Quiz No.5</i> Problems : Sheet (14) # 36-52
		Tutorial	Problems : Sheet (14) # 85-100
		H.W	Problems : Sheet (14) # 136-151

11	Dec.8 th	Lecture	<i>Inverse Laplace Transforms</i> Problems : Ex 4.2 Page 209 #1-20 (odd) Sheet (15) # 1-36
		Tutorial	Problems : Ex 4.2 Page 209 #1-20 (even) Sheet (15) # 37-70
		H.W	Problems : Ex 4.2 Page 209 #21-29 Sheet (15) # 71-112
12	Dec.15 th	Lecture	<i>Applications: Solution of ODEs using Laplace Transforms</i> <i>Solution of integral equation (Volterra Integral Eq.) using Laplace Transforms-</i> <i>Solution of R-L circuit using the Laplace Transforms</i> +12th week exam Problems : Sheet (16) # 1-13
		Tutorial	Problems : Sheet (16) # 14-25
		H.W	Problems : Sheet (16) # 26-39
13	Dec.22 nd	Lecture	<i>Ch.4: Fourier series: Fourier series for functions of period 2P</i> Problems : Sheet (17) # 1,5
		Tutorial	Problems : Sheet (17) # 9
14	Dec.29 th	Lecture	<i>Fourier series for Even and Odd functions</i> <i>Fourier series for harmonic functions</i> Problems : Sheet (17) # 2,3,4
		Tutorial	Problems : Sheet (17) # 6-8
15	Jan.5 th	Lecture	<i>Revision</i>
		Tutorial	<i>Revision</i>
16	Jan.12 th	Final Exam	

Good Luck