

COURSE: ADVANCED MATHEMATICS		
DEGREE: BACHELOR IN AEROSPACE ENGINEERING	COURSE: 2	TERM: 1

28 lectures along 14 weeks

WEEKLY PLANNING							
WEEK	SESSION	CONTENTS	GROUP (indicated by X)		STUDENT WORK DURING WEEK		
			THEORY	PRACTICE	DESCRIPTION	LECTURE HOURS	ADDITIONAL WORK (Max. 7h/week)
1	1	<b>CHAPTER 1: INTRODUCTION</b> 1.1 Basic models; direction fields 1.2 Classification of differential equations	X			1.5	6.5
	2	(*) Exercises about theory content for week 1		X	(**) Additional exercises from collection and textbooks	1.5	
2	3	<b>CHAPTER 2: FIRST ORDER DIFFERENTIAL EQUATIONS</b> 2.1 Linear equations; integrating factors 2.2 Separable equations 2.3 Exact equations	X			1.5	6.5
	4	(*) Exercises about theory content for week 2		X	(**) Additional exercises from collection and textbooks	1.5	
3	5	<b>CHAPTER 3: SECOND ORDER LINEAR EQUATIONS</b> 3.1 Definitions and examples 3.2 Linear homogeneous equations 3.3 Homogeneous equations with constant coefficients	X			1.5	6.5
	6	(*) Exercises about theory content for week 3		X	(**) Additional exercises from collection and textbooks	1.5	

4	7	3.4 Inhomogeneous equations: undetermined coefficients 3.5 Variation of constants	X			1.5	6.5
4	8	<b>Mid-term exam 1</b> (* ) Exercises about theory content for week 4		X	(** ) Additional exercises from collection and textbooks	1.5	
5	9	<b>CHAPTER 4: SYSTEMS OF FIRST ORDER LINEAR EQUATIONS</b> 4.1 Basic theory; higher-order equations 4.2 Explicit solutions of non-homogeneous linear systems	X			1.5	6.5
5	10	(* ) Exercises about theory content for week 5		X	(** ) Additional exercises from collection and textbooks	1.5	
6	11	4.3 Planar linear systems <b>CHAPTER 5: NONLINEAR SYSTEMS AND STABILITY</b> 5.1 Planar nonlinear systems	X			1.5	6.5
6	12	(* ) Exercises about theory content for week 6		X	(** ) Additional exercises from collection and textbooks	1.5	
7	13	5.2 Stability 5.3 Periodic solutions 5.4 Higher-dimensional systems	X			1.5	6.5
7	14	(* ) Exercises about theory content for weeks up to 6		X	(** ) Additional exercises from collection and textbooks	1.5	
8	15	<b>CHAPTER 6: PARTIAL DIFFERENTIAL EQUATIONS: INTRODUCTION</b> 6.1 Examples and physical derivation 6.2 Types of equations and data; well vs ill-posed problems	X			1.5	6.5
8	16	<b>Mid-term exam 2</b> (* ) Exercises about theory content for week 8		X	(** ) Additional exercises from collection and textbooks	1.5	
9	17	<b>CHAPTER 7: SEPARATION OF VARIABLES</b> 7.1 Problem resolution by separation of variables	X			1.5	6.5
9	18	(* ) Exercises about theory content for week 9		X	(** ) Additional exercises from collection and textbooks	1.5	
10	19	7.2 Fourier trigonometric series: basic properties	X			1.5	6.5
10	20	(* ) Exercises about theory content for week 10		X	(** ) Additional exercises from collection and textbooks	1.5	
11	21	<b>CHAPTER 8: STURM-LIOUVILLE PROBLEMS</b> 8.1 Sturm-Liouville problems 8.2 Self-adjoint operators and spectrum 8.3 Rayleigh's quotient	X			1.5	6.5

11	22	(*) Exercises about theory content for week 11		X	(**) Additional exercises from collection and textbooks	1.5		
12	23	8.4 Generalized Fourier series 8.5 Multivariable Sturm-Liouville problems	X			1.5	6.5	
12	24	<b>Mid-term exam 3</b> (* ) Exercises about theory content for week 12		X	(**) Additional exercises from collection and textbooks	1.5		
13	25	<b>CHAPTER 9: NON-HOMOGENEOUS PROBLEMS</b> 9.1 Shifting the data 9.2 Fredholm's alternative	X			1.5	6.5	
13	26	(* ) Exercises about theory content for week 13		X	(**) Additional exercises from collection and textbooks	1.5		
14	27	9.3 Eigenfunction expansions	X			1.5	6.5	
14	28	(* ) Exercises about theory content for week 14		X	(**) Additional exercises from collection and textbooks	1.5	6.5	
<b>Subtotal 1</b>							<b>42</b>	<b>91</b>
<b>Total 1 (Lecture hours plus additional work, weeks 1 through 14)</b>							<b>133</b>	

15		Additional lectures, tutorial sessions, etc.				2		
16								
17		Final exam (preparations; attendance)				3	12	
18								
<b>Subtotal 2</b>							<b>5</b>	<b>12</b>
<b>Total 2 (Lecture hours plus additional work, weeks 15 through 18)</b>							<b>17</b>	

<b>TOTAL (Subtotal 1 + Subtotal 2. Maximum 180 hours)</b>							<b>150</b>	
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NOTES:

(\* ) Discussion of selected exercises from the course collection, related with the theory session of the week

(\*\*) Discussion of selected exercises from the course collection and from the recommended textbooks, related with the theory session of the week