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COURSE: ADVANCED MATHEMATICAL METHODS I		
DEGREE: BACHELOR IN STATISTICS AND BUSINESS ADMINISTRATION		**TERM: 2**

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	**CHAPTER 1: REAL EUCLIDEAN SPACE** 1.1 Vectors and scalar product 1.2 Open and closed sets	X		Section 12.1 to 12.3 Stewart and/or Sections 1.1, 1.2, 1.5, and 2.2 (Marsden)	1.5	6.5
1	2	(*) Exercises about theory content for week 1		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
2	3	**CHAPTER 2: FUNCTIONS OF SEVERAL VARIABLES** 2.1 Functions of several variables - Functions, graphs, level sets, sections	X		Section14.1 (Stewart) and/or Sections 14.1 and 14.3 (Salas)	1.5	6.5
2	4	(*) Exercises about theory content for week 2		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
3	5	2.2 Limits and continuity - Definitions and basic properties	X		Section 14.2 (Stewart) and/or Sections 14.1, 14.6.1 and 14.6.2 (Salas)	1.5	6.5
3	6	(*) Exercises about theory content for week 3		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
4	7	**CHAPTER 3: DIFFERENTIABILITY** - Partial derivatives - Differentiability and tangent plane; Jacobian matrix	X		Sections 14.3-14.4 (Stewart) and/or Sections 15.1 and 15.2 (Salas)	1.5	6.5
4	8	(*) Exercises about theory content for week 4		X	(**) Additional exercises on the indicated	1.5	

					sections from the textbooks		
5	9	**CHAPTER 4: PROPERTIES OF THE DERIVATIVE** - Basic properties. Chain rule - Directional derivatives. Gradient field	X		Sections 14.5 and 14.6 (Stewart) and/or Section 15.3 (Salas)	1.5	6.5
5	10	(*) Exercises about theory content for week 5		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
6	11	- Higer-order derivatives; Hessian matrix - Divergence, curl, and Laplacian	X		Sections 14.3 and 16.5 (Stewart) and/or Sections 15.3 (Salas)	1.5	6.5
6	12	(*) Exercises about theory content for week 6		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
7	13	**CHAPTER 5: APPLICATIONS OF THE DERIVATIVE** 5.1 Approximation of functions: Taylor's polynomial	X		Section 3.2 (Marsden)	1.5	6.5
7	14	(*) Exercises about theory content for week 7		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
8	15	5.2 Unconstrained optimization - Critical points - Local extrema 5.3 Absolute extrema - Compact domains	X		Section 14.7 (Stewart) and/or Section 15.5 (Salas)	1.5	6.5
8	16	(*) Exercises about theory content for week 8		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
9	17	5.4 Constrained optimization - Lagrange multipliers	X		Section 14.8 (Stewart) and/or Section 15.6 (Salas)	1.5	6.5
9	18	(*) Exercises about theory content for week 9		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
10	19	**CHAPTER 6: DOUBLE AND TRIPLE INTEGRALS** 6.1 Rectangular regions in the plane and in space - Iterated integrals - Cavalieri's principle - Fubini's Theorem	X		Sections 15.1, 15.2, and 15.7 (Stewart) and/or Sections 16.2, 16.3, 16.6, and 16.7 (Salas)	1.5	6.5
10	20	(*) Exercises about theory content for week 10		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	6.5
11	21	6.2 Elementary regions - Change in the order of integration 6.3 Properties of double and triple integrals	X		Sections 15.3 and 15.7 (Stewart) and/or Section 16.3, 16.7 (Salas)	1.5	6.5
11	22	(*) Exercises about theory content for week 11		X	(**) Additional exercises on the indicated	1.5	

					sections from the textbooks		
12	23	6.4 Changes of variables - General transformations; Jacobian	X		Sections 15.4, 15.8, and 15.9 (Stewart) and/or Sections 16.4 and 16.10 (Salas)	1.5	6.5
12	24	(*) Exercises about theory content for week 12		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
13	25	- Polar coordinates - Cylindrical and spherical coordinates	X		Sections 15.4, 15.8, and 15.9 (Stewart) and/or Sections 16.4, 16.8, 16.9, and 16.10 (Salas)	1.5	6.5
13	26	(*) Exercises about theory content for week 13		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
14	27	6.5 Applications - Areas (volumes) of 2D (3D) regions - Moments of continuum distributions	X		Section 15.5 (Stewart) and/or Section 16.5 (Salas)	1.5	6.5
14	28	(*) Exercises about theory content for week 14		X	(**) Additional exercises on the indicated sections from the textbooks	1.5	
						Subtotal 1	**42** **91**
					Total 1 *(Lecture hours plus additional work, weeks 1 through 14)*		133

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

TOTAL *(Subtotal 1 + Subtotal 2. Maximum 180 hours)*	**150**

NOTES:

(Marsden) J. E. Marsden, and A. J. Tromba: “Vector Calculus”, Pearson (5th. edition)

(Salas) S. L. Salas, E. Hille, and G. Etgen: “Calculus: one and several variables”, Wiley (9th. edition)

(Stewart) J. Stewart: “Multivariable Calculus”, Thomson Learning (4th. edition)

(*) 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