Universidad Carlos III de Madrid
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COURSE: CALCULUS II		
DEGREE: BACHELOR IN BIOMEDICAL ENGINEERING	**ACADEMIC YEAR: 2015-2016**	**TERM: 2**

28 sessions along 14 weeks

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	GROUPS (mark X)		WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS	DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	**CHAPTER 1: DIFFERENTIAL CALCULUS IN SEVERAL VARIABLES** 1.1 R^n as an Euclidean space; topology 1.2 Functions of n variables - Functions, graphs, and level sets	X		Sections 14.1 and 16.2 [WHT] and/or sections 1.5, 2.1, 2.2 [MT]	1,67	6,3
1	2	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
2	3	1.3 Limits and Continuity	X		Section 14.2 [WHT] and/or section 2.2 [MT]	1,67	6,3
2	4	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
3	5	1.4 Differentiability - Partial derivatives - Derivative; Jacobian matrix	X		Section 14.3 [WHT] and/or section 2.3 [MT]	1,67	6,3
3	6	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	

4	7	- Properties of the derivative - Chain rule - Directional derivatives; gradient vector	X		Sections 14.3-14.6 [WHT] and/or sections 2.5, 2.6 [MT]	1,67	6,3
4	8	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
5	9	**CHAPTER 2: LOCAL PROPERTIES OF FUNCTIONS** 2.1 Higher order derivatives - Iterated derivatives; equality of mixed partials - Differential operators: divergence, curl, Laplacian	X		Sections 16.4, 16.7, 16.8 [WHT] and/or sections 3.1, 3.2 [MT]	1,67	6,3
5	10	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
6	11	- Taylor polynomial; Hessian matrix 2.2 Optimization - Local extrema	X		Sections 14.7, 14.9 [WHT] and/or sections 3.2, 3.3 [MT]	1,67	6,3
6	12	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
7	13	- Absolute/global extrema - Constrained optimization: Lagrange multipliers	X		Sections 14.7, 14.9 [WHT] and/or section 3.3, 3.4 [MT]	1,67	6,3
7	14	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
8	15	**CHAPTER 3: INTEGRAL CALCULUS ON R^n** 3.1 Double and triple integrals - Integrals over rectangular regions - Fubini's theorem	X		Sections 15.1, 15.5 [WHT] and/or sections 5.1-5.2 [MT]	1,67	6,3
8	16	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
9	17	- Arbitrary 2-dimensional regions - The triple integral	X		Sections 15.2, 15.3, 15.5 [WHT and/or sections 5.3-5.5 [MT]	1,67	6,3
9	18	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
10	19	3.2 Changes of variables - Changes of variables; Jacobian - Polar, cylindrical, and spherical coordinates 3.3 Applications - Average; center of mass; moments of inertia	X		Sections 15.4, 15.6-15.8 [SHE] and/or sections 6.1-6.3 [MT]	1,67	6,3
10	20	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
11	21	**CHAPTER 4: INTEGRALS OVER CURVES AND SURFACES** 4.1 Line integrals - Parametrized curves - Line integral - Conservative fields	X		Sections 16.1-16.3 [WHT] and/or sections 7.1, 7.2 [MT]	1,67	6,3

11	22	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67		
12	23	4.2 Surface integrals - Parametrized surfaces - Area of a Surface - Integrals of scalar functions and vector fields	X		Sections 16.5, 16.6 [WHT] and/or sections 7.3-7.6 [MT]	1,67	6,3	
12	24	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67		
13	25	4.3 Integral theorems of vector analysis - Planar case: Green's and divergence theorems - Stokes' theorem	X		Sections 16.4, 16.7 [WHT] and/or sections 8.1, 8.2 [MT]	1,67	6,3	
13	26	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67		
14	27	- Conservative fields - Gauss' theorem	X		Sections 16.7, 16.8 [WHT] and/or sections 8.3, 8.4 [MT]	1,67	6,3	
14	28	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	6,3	
						Subtotal 1	**47**	**88**
					Total 1 *(Hours of class plus student homework hours between weeks 1-14)*		135	

15		Tutorials, handing in, etc				2		
16		Assessment, final exam preparation				3	10	
17								
18								
						Subtotal 2	**3**	**12**
					Total 2 *(Hours of class plus student homework hours between weeks 15-18)*		15	

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

Notes:

[MT] Marsden and Tromba, "Vector Calculus", W. H. Freeman (6th edition, 2012)
[WHT] Weir, Hass and Thomas, "Thomas' Calculus", Wiley (12th edition, 2009)

(*) Discussion of selected exercises from the course collection that correspond to the previous lecture

(**) Problem solving for selected exercises from the course collection and sections of [MT], [WHT] that correspond to the previous lecture
(+) Lecture hours are always 1.67 (1.67 hours*28 sessions = 46.76 hours)