uc3m | Universidad **Carlos III** de Madrid

COURSE: CALCULUS II		
DEGREE: BACHELOR IN BIOMEDICAL ENGINEERING	ACADEMIC YEAR: 2020-2021	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	4/02	**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	5/02 & 10/02	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
2	11/02	1.3 Limits and Continuity	X		Section 14.2 [WHT] and/or section 2.2 [MT]	1,67	6,3
2	12/02 & 17/02	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
3	18/02	1.4 Differentiability - Partial derivatives - Derivative; Jacobian matrix	X		Section 14.3 [WHT] and/or section 2.3 [MT]	1,67	6,3
3	19/02 & 24/02	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
4	25/02	- 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	26/02 & 3/03	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
5	4/03	**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	5/03 & 10/03	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
6	11/03	- Taylor polynomial; Hessian matrix 2.2 Optimization - Local extrema - Absolute/global extrema	X		Sections 14.7, 14.9 [WHT] and/or sections 3.2, 3.3 [MT]	1,67	6,3
6	12/03 & 17/03	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
7	18/03	- Free optimization problems - Constrained optimization: Lagrange multipliers	X		Sections 14.7, 14.9 [WHT] and/or section 3.3, 3.4 [MT]	1,67	6,3
7	22/03 & 24/03	First Mid term Exam		X		1,67	
8	25(03	**CHAPTER 3: INTEGRAL CALCULUS ON R^n** 3.1 Double and triple integrals - Iterated integrals - Cavalieri's principle - 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	26/03 & 7/04	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
9	8/04	- Arbitrary 2- and 3-dimensional regions - Change in the order of integration 3.2 n-dimensional integrals	X		Sections 15.2, 15.3, 15.5 [WHT and/or sections 5.3-5.5 [MT]	1,67	6,3
9	9/04 & 14/04	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	

10	15/04	3.3 Changes of variables and applications - Changes of variables; Jacobian - Polar, cylindrical, and spherical coordinates - 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	16/04 & 21/04	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
11	22/04	**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	23/04 & 28/04	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
12	29/04	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	30/04 & 5/05	Second Mid Term Exam		X		1,67	
13	6/05	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	7/05 & 12/05	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
14	13/05	- Conservative fields - Gauss' theorem	X		Sections 16.7, 16.8 [WHT] and/or sections 8.3, 8.4 [MT]	1,67	6,3
14	14/05 & 19/05	(*) 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							
17		Assessment, final exam preparation				3	10
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)