

COURSE: CALCULUS II		
DEGREE: BACHELOR IN INDUSTRIAL TECHNOLOGIES ENGINEERING	ACADEMIC YEAR: 2021-2022	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 \mathbb{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	X		Sections 14.7, 14.9 [WHT] and/or sections	1,67	6,3

		2.2 Optimization <ul style="list-style-type: none"> - Local extrema - Absolute/global extrema 			3.2, 3.3 [MT]		
6	12	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
7	13	<ul style="list-style-type: none"> - 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	14	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
8	15	CHAPTER 3: INTEGRAL CALCULUS ON \mathbb{R}^n 3.1 Double and triple integrals <ul style="list-style-type: none"> - 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	16	First partial exam (*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
9	17	<ul style="list-style-type: none"> - 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	18	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
10	19	3.3 Changes of variables and applications <ul style="list-style-type: none"> - 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	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 <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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	Second partial exam (*) 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)