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COURSE: CALCULUS II		
DEGREE: BACHELOR IN DATA SCIENCE AND ENGINEERING	ACADEMIC YEAR: 2018-2019	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	**Test 1** (*) 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	**Test 2** (*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
6	11	- 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	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
7	13	- 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	**Test 3** (*) 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 - 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	(*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
9	17	- 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	**Test 4** (*) Discussion of selected exercises		X	(**) Problem solving for selected exercises	1,67	
10	19	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	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	X		Sections 16.1-16.3 [WHT] and/or sections 7.1, 7.2 [MT]	1,67	6,3

Week	Session	Content			References	Hours	Hours
		- Conservative fields					
11	22	**Test 5** (*) 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	**Test 6** (*) 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							
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. <u>Maximum 180 hours</u>)*	**150**

Notes:

[MT] Marsden and Tromba, "Vector Calculus", W. H. Freeman (6th edition, 2012)

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[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)