Universidad
Carlos III de Madrid

COURSE NAME: Calculus II		
DEGREE: AUDIOVISUAL SYSTEMS ENGINEERING, COMMUNICATION SYSTEMS ENGINEERING, AND TELEMATICS ENGINEERING	COURSE: 1	TERM: 2

SCHEDULE

WEEK	SE-SSION	SESSION CONTENT	GROUP (Tick X) LARGE	SMALL			STUDENT WORK DURING WEEK DESCRIPTION	LECTURE HOURS	STUDENT WORK Max 7 h per week
1	1	**CHAPTER 1: DIFFERENTIAL CALCULUS IN SEVERAL VARIABLES** 1.1 Basic notions in R^n 1.2 Functions of n variables	1				Sections 15.1-15.3 and 15.5 [SHE] and/or sections 1.5, 2.1, 2.2 [MT]	1,66	6,5
1	2	1.3 Limits and Continuity	2				Section 15.6 [SHE] and/or section 2.2 [MT]	1,66	6,5
2	3	(*) Discussion of selected exercises		1			(**) Problem solving for selected exercises	1,66	6,5
2	4	1.4 Differentiability - Partial derivatives - Derivative; Jacobian matrix	3				Sections 15.4, 16.1 [SHE] and/or section 2.3 [MT]	1,66	6,5
3	5	(*) Discussion of selected exercises		2			(**) Problem solving for selected exercises	1,66	6,5
3	6	- Properties of the derivative. Chain rule - Directional derivatives; gradient vector	4				Sections 16.2-16.4 [SHE] and/or sections 2.5, 2.6 [MT]	1,66	6,5
4	7	(*) Discussion of selected exercises		3			(**) Problem solving for selected exercises	1,66	6,5
4	8	**CHAPTER 2: LOCAL PROPERTIES OF FUNCTIONS** 2.1 Higher order derivatives - Iterated derivatives; equality of mixed partials - Differential operators: divergence, curl, Laplacian	5				Sections 16.5, 18.8 [SHE] and/or sections 3.1, 4.3, 4.4 [MT]	1,66	6,5
5	9	**Exam Chapter 1** (*) Discussion of selected exercises		4			(**) Problem solving for selected exercises	1,66	6,5

5	10	2.2 Optimization - Local extrema - Absolute/global extrema - Free and constrained optimization problems	6					Sections 16.5, 16.6, 16.7 [SHE] and/or sections 3.3, 3.4 [MT]	1,66	6,5
6	11	(*) Discussion of selected exercises		5				(**) Problem solving for selected exercises	1,66	6,5
6	12	**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	7					Sections 17.1, 17.2 [SHE] and/or sections 5.1-5.2 [MT]	1,66	6,5
7	13	(*) Discussion of selected exercises		6				(**) Problem solving for selected exercises	1,66	6,5
7	14	- Arbitrary 2- and 3-dimensional regions - Change in the order of integration 3.2 n-dimensional integrals	8					Sections 17.3, 17.5-17.7 [SHE] and/or sections 5.3-5.5 [MT]	1,66	6,5
8	15	**Exam Chapter 2** (*) Discussion of selected exercises		7				(**) Problem solving for selected exercises	1,66	6,5
8	16	3.3 Changes of variables and applications - Changes of variables; Jacobian	9					Section 17.10 [SHE] and/or sections 6.1, 6.2 [MT]	1,66	6,5
9	17	(*) Discussion of selected exercises		8				(**) Problem solving for selected exercises	1,66	6,5
9	18	- Polar, cylindrical, and spherical coordinates - Average; center of mass; moments of inertia	10					Sections 17.4, 17.8, 17.9 [SHE] and/or sections 6.2, 6.3 [MT]	1,66	6,5
10	19	(*) Discussion of selected exercises		9				(**) Problem solving for selected exercises	1,66	6,5
10	20	**CHAPTER 4: INTEGRALS OVER CURVES AND SURFACES** 4.1 Line and path integrals - Parametrized curves - Path integral; line integral Conservative fields	11					Sections 18.1, 18.2, 18.4 [SHE] and/or sections 7.1, 7.2 [MT]	1,66	6,5
11	21	**Exam Chapter 3** (*) Discussion of selected exercises		10				(**) Problem solving for selected exercises	1,66	6,5
11	22	4.2 Surface integrals - Parametrized surfaces - Area of a surface - Integrals of scalar functions and vector fields	12					Sections 18.6-18.8 [SHE] and/or sections 7.3-7.6 [MT]	1,66	6,5

12	23	(*) Discussion of selected exercises		11			(**) Problem solving for selected exercises	1,66	6,5
12	24	4.3 Integral theorems of vector analysis - Planar case: Green's and divergence theorems - Stokes' theorem	13				Section 18.5, 18.10 [SHE] and/or sections 8.1, 8.2 [MT]	1,66	6,5
13	25	(*) Discussion of selected exercises		12			(**) Problem solving for selected exercises	1,66	6,5
13	26	- Conservative fields - Gauss' theorem	14				Sections 18.8, 18.9 [SHE] and/or sections 8.3, 8.4 [MT]	1,66	6,5
14	27	(*) Discussion of selected exercises		13			(**) Problem solving for selected exercises	1,66	6,5
14	28	(*) Discussion of selected exercises		14			(**) Problem solving for selected exercises	1,66	6,5
15	29	**Exam Chapter 4** Overview of the course	15				Exam preparation	1,66	
SUBTOTAL								**48,14 + 91 = 139,14**
15-17		Extra sessions, tutorials, etc.					Exam preparation		18 h
TOTAL								**157,14**

[MT] Marsden and Tromba, "Vector Calculus", W. H. Freeman (5th edition, 2003)

[SHE] Salas, Hille, and Etgen, "Calculus: one and several variables", Wiley (10th edition, 2007)

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

(**) Problem solving for selected exercises from the course collection and sections of [MT], [SHE] that correspond to the previous large-group lecture