Universidad Carlos III de Madrid

DENOMINACIÓN ASIGNATURA: ORDINARY DIFFERENTIAL EQUATIONS		
DEGREE: APPLIED MATHEMATICS AND COMPUTING	YEAR: THIRD	TERM: FIRST

WEEK	SE-SSION	DESCRIPTION OF THE CONTENT OF EACH SESSION	GRUPO		STUDENTS WORK DURING THE WEEK		
			THEORY GROUP	PROBLEM GROUP	DESCRIPTION OF THE MATERIAL TO BE STUDIED	HOURS OF LECTURES	STUDENTS WORK (MAX. 7 HOURS)
1	1	INTRODUCTION TO DIFFERENTIAL EQUATIONS • NOTATION • CLASSIFICATION OF ODES • MODELIZATION	X			1,6	6,5
1	2	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
2	3	MODELS OF ODES FIRST METHODS OF RESOLUTION. FIRST AND SECOND ORDER LINEAR EQUATIONS	X			1,6	6,5
2	4	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
3	5	WRONSKIAN. MEHTOD OF SEPARATION OF VAIRABLES. INDETERMINED COEFFICIENTS METHOD. POWER SERIES. APPLICATIONS	X			1,6	6,5
3	6	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
4	7	FUNDAMENTAL THEORY • GRONWALL'S LEMMA • PICARD'S THEOREM	X			1,6	6,5
4	8	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	

5	9	FUNDAMENTAL THEOREM • CAUCHY-PEANO'S THEOREM • CONTINUATION OF SOLUTIONS	X			1,6	6,5
5	10	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
6	11	FUNDAMENTAL THEOREM • CONCEPT OF A FLUX • CONTRACTIVE MAP • CONTINUOUS DEPENDENCE FIRST PARTIAL EVALUATION	X			1,6	6,5
6	12	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
7	13	LINEAR SYTEMS OF ODES • CLASSIFICATION • FIRST METHODS OF RESOLUTION	X			1,6	6,5
7	14	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
8	15	SOLUTION FOR LINEAR SYTEMS. SUBSTITUTION, ASSOCIATED MATRIX, EXPONENTIAL OF A MATRIX. COMPLETE LINEAR SYSTEM. METHOD OF THE VARIATION OF CONSTANTS	X			1,6	6,5
8	16	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
9	17	STABILITY AND INSTABILITY OF SOLUTIONS • PHASE PORTRAIT	X			1,6	6,5
9	18	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
10	19	ORBITS. AUTONOMOUS SYSTEMS. INVARIANT SETS. LIMITING SETS	X			1,6	6,5
10	20	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
11	21	INSTABILITY FROM THE LINEARIZATION OF THE PROBLEM	X			1,6	6,5
11	22	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
12	23	LYAPUNOV FUNCTIONS. GRADIENT/HAMILTONIANS/CONSERVATIVE SYSTEMS SECOND MID TERM EXAM	X			1,6	6,5
12	24	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
13	25	PERIODIC TRAJECTORIES	X			1,6	6,5
13	26	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	

14	27	POINCARE-BENDIXON THEORY	X			1,6	6,5
14	28	(*) DISCUSSION OF SELECTED EXERCICES		X	(**) PROBLEMS SOLVING OF SELECTED EXERCICES	1,6	
47 (+) + 86 (++) = 133 hours							
15-17		EXTRA SESSIONS, TUTORIALS, PREPARATION FOR EXAMS			23hours		
156 hours							

(*) Discussion of selected problems from the collection of them provided for the course
(**) Problems solving for selected exercices from the collection provided for course.
(+) Lectures hours are always 1.667 (1.667*28 sessions=46.68 hours)
(++) Weekly hours of student self-study are always 6.16 (6.16*14 weeks=86.32 hours)