Universidad Carlos III de Madrid

COURSE: Advanced Mathematics		
DEGREE: Bachelor in telecommunications technology engineering	2nd YEAR	FIRST SEMESTER

WEEKLY PROGRAMMING

WEEK	SESSION	DESCRIPTION	GROUPS		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Inidicate YES/NO If the session needs 2 teachers: Maximum 4 sessions	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURE	SEMINAR			DESCRIPTION	CLASS HOURS	HOMEWORK HOURS Maximum 7 H
1	1	Lesson 1. Ordinary differential equations: Introduction.	X			NO	Examples and general definitions. Order of an ODE. Solution of an ODE: explicit and implicit solutions. General and particular solutions. Initial conditions.	1,66	6
1	2	Lesson 1 exercises		X		NO	Exercises.	1,66	
2	3	Lesson 2. First order ordinary differential equations.	X			NO	Geometric interpretation: Vector field and integral curves. Elementary integration methods.	1,66	6
2	4	Lesson 2 exercises		X		NO	Exercises.	1,66	
3	5	Lesson 3: Linear second order ordinary differential equations.	X			NO	Estructura de solución general de la ecuación de segundo orden.	1,66	6
3	6	Lesson 3 exercises		X		NO	Exercises.	1,66	

4	7	Lesson 4. Ordinary differential equations: power series solutions and special functions I.	X			NO	Power series solutions of second order equations. Classification: regular points, regular singular points.	1,66	6
4	8	Lesson 4 exercises		X		NO	Exercises.	1,66	
5	9	Lessonn 5. . Ordinary differential equations: power series solutions and special functions II.	X			NO	Singular points: Frobenius' method. Legendre, Hermite and Bessel equations.	1,66	6
5	10	Lesson 5 exercises		X		NO	Exercises.	1,66	
6	11	Lesson 6. Ordinary differential equations: Laplace transform.	X			NO	Using Laplace transform to solve ODEs.	1,66	6
6	12	Lesson 6 exercises		X		NO	Exercises.	1,66	
7	13	Lesson 7. Complex analysis: Introduction.	X			NO	Complex numbers and functions review.	1,66	6
7	14	Lesson 7 exercises		X		NO	Exercises.	1,66	
7	15	First continuous assessment test	X			NO	Exam of the first five lessons (ODEs)		
8	16	Lesson 8. Complex analysis I.	X			NO	Limits, continuity, and differentiability of complex functions. Cauchy-Riemann equations holomorphic functions.	1,66	6
8	17	Lesson 8 exercises		X		NO	Exercises.	1,66	
9	18	Lesson 9. Complex analysis II.	X			NO	Complex integration. Curves parametrization. Primitives. Cauchy-Goursat theorem. Cauchy's. integral formula.	1,66	6
9	19	Lesson 9 exercises		X		NO	Exercises.	1,66	

10	20	Lesson 10. Complex analysis III.	X			NO	Complex series. Taylor series. Analytic functions. Laurent series.	1,66	6
10	21	Lesson 10 exercises		X		NO	Exercises.	1,66	
11	22	Lesson 10. Complex analysis IV.	X			NO	Singularities, zeros and poles. Residues. Cauchy's residues theorem. Some applications of the integration using residues.	1,66	6
11	23	Lesson 11 exercises		X		NO	Exercises.	1,66	
12	24	Lesson 12. Fourier series.	X			NO	Periodic and orthogonal functions. Fourier series. Convergence. Sines and cosines series. Fourier series. in semi-intervals ODEs solutions using Fourier . series.	1,66	6
12	25	Lesson 12 exercises		X		NO	Exercises.	1,66	
12	26	Second continuous assessment test.					Exam of the first eight Lessons (ODEs and complex analysis).		
13	27	Lesson 13. Partial differential equations I: Fourier's method I.	X			NO	Basic concepts: Definitions, order, linearity, Superposition principle, quasi-linearity, Initial and boundary conditions. Classic equations I: Heat equation.	1,66	6
13	28	Lesson 13 exercises		X		NO	Exercises.	1,66	
14	29	Sesión 14. Partial differential equations I: Fourier's method II.	X			NO	Classic equations II: Wave and Laplace equations.	1,66	6
14	30	Lesson 14 exercises.		X		NO	Exercises.	1,66	
SUBTOTAL								**48 + 84 = 132**	
16-18		Assessment						6	12
TOTAL								**150**	