uc3m | Universidad Carlos III de Madrid
Vicerrectorado de Estudios
Apoyo a la docencia y gestión del grado

COURSE: Complex Variables and Transforms		
DEGREE: Physical Engineering	**YEAR: 2**	**TERM: 1**

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max.Estim. 6,5h)
1	1	Complex numbers. Complex functions. Limits. Continuous functions.	XX			Exercises	1,66	6,5
	2	Derivatives and Cauchy-Riemann equations. Harmonic functions.	XX			Exercises	1,66	
2	3	Elementary functions. Polynomials. Exponential function. Trigonometric functions. Hyperbolic functions.	XX			Exercises	1,66	6,5
	4	Logarithm. Complex exponents. Inverses of trigonometric and hyperbolic functions.	XX			Exercises	1,66	
3	5	Integrals in the complex plane. Contour integrals. Cauchy-Goursat theorem. Cauchy formula.	XX			Exercises	1,66	6,5
	6	Morera's theorem. Entire functions. Bounds for analytic functions. Fundamental theorem of algebra.	XX			Exercises	1,66	
4	7	Sequences and convergence criteria. Power series. Radius of convergence.	XX			Exercises	1,66	6,5
	8	Taylor series. Laurent series. Analytic continuation.	XX			Exercises	1,66	
5	9	Power expansions and linear differential equations. Frobenius theory.				Exercises	1,66	6,5
	10	Special functions of Mathematical Physics	XX			Exercises	1,66	

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6	11	Zeros of a function. Singularities. Poles	XX			Exercises	1,66	6,5
	12	Residue formula. Residue theorem. Real integrals of trigonometric functions.	XX			Exercises	1,66	
7	13	Real improper integrals. Integrals of functions with branch points.	XX			Exercises	1,66	6,5
	14	Aplications of the residue Theorem to series summation	XX			Exercises	1,66	
8	15	Summary of complex variables	XX			Exercises	1,66	6,5
	16	First partial test					1,66	
9	17	Fourier series Basic definitions. The space of square integrable functions. Pointwise convergence. Uniform convergence.	XX			Exercises	1,66	6,5
	18	Application of Fourier series to differential and partial differential equations.	XX			Exercises	1,66	
10	19	Fourier transform. Basic definitions and properties. Inverse Fourier transform.	XX			Exercises	1,66	6,5
	20	Convolution. Representation of aperiodic signals. Discrete time Fourier transform.	XX			Exercises	1,66	
11	21	Laplace transform Definition, properties and convergence. Inverse Laplace transform.	XX			Exercises	1,66	6,5
	22	Derivatives, integrals, and convolution. Applications to systems of linear differential equations. Transfer function.	XX			Exercises	1,66	
12	23	z-transform. Convergence region and other properties. Inverse z-transform.	XX			Exercises	1,66	6,5
	24	Transforms between continuous and discrete time signals. Applications to linear difference equations	XX			Exercises	1,66	
13	25	Linear time-invariant (LTI) systems.	XX			Exercises	1,66	6,5
	26	Analysis of LTI systems with transforms.	XX			Exercises	1,66	
14	27	Summary of integral transforms.	XX			Exercises	1,66	6,5
	28	Second partial test					1,66	

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	TEACHING (mark X) LECTURES	TEACHING (mark X) SEMINARS	SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max.Estim. 6,5h)
	29	Additional session	XX			General Smmary	1,66	3,25
						Subtotal 1	**48**	**94**
						Total 1 *(Hours of class plus student homework)*	**142**	

WEEK	SESSION	DESCRIPTION	LECTURES	SEMINARS	SPECIAL ROOM	DESCRIPTION	CLASS HOURS	HOMEWORK HOURS
15		Tutorials, handing in, etc				Tutorials and homeworks	3,6	-
16		Assessment				Partial and Globall assessment	4	10
17								
18								
						Subtotal 2	**8**	**10**
						Total 2 *(Hours of class plus student homework)*	**18**	

TOTAL A *(Maximun 160 horas)*	**160**

LABORATORIES CLASSES PROGRAMMING

WEEK	SESSION	DESCRIPTION	LABORATORY	WEEKLY PROGRAMMING FOR STUDENT DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. Estim. 6,5h)
	1				1,66	6,5

WEEKLY PLANNING							
WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max.Estim. 6,5h)
	2						1,66	6,5
						Subtotal 3	3,5	6,5
						Total 3 *(Hours of class plus student homework)*	10	
						TOTAL B *(Total 3)*	10	
TOTAL *(Total A + Total B. Maximun 170 horas)*							170	