Universidad Carlos III de Madrid
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COURSE: NANOPHOTONICS (3 ECTS)		
MASTER: Master in Photonics Engineering	**YEAR: 2018-2019**	**TERM: 1st**

WEEKLY PLANNING

	SESSION	DESCRIPTION	GROUPS (mark X)		Special room for session (computer classroom, audio-visual classroom …)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS /LAB[1]		DESCRIPTION	CLASS HOURS	HOMEWORK HOURS
	1	INTRODUCTION of the subject. **Basic concepts.** Near- and far-field, diffraction limit, evanescent waves.	x			Introduction to the subject.	1,5	4
	2	**Light-matter Interaction**. Concepts of scattering, absorption and extinction. Mie theory	x			Previous reading and revision of class materials. Decision about the topics of the works.	1,5	
	3	**Fabrication Techniques of nanophotonic structures.** Top-down and bottom-up techniques for nanofabrication.	x			Previous reading and revision of class materials.	1,5	15
	4	**Characterization techniques.** Near-field microscopy, AFM, confocal microscopy	x			Previous reading and revision of class materials.	1,5	
	5	**Plasmonic and Resonant Dielectric nanoparticles.** Surface plasmon resonances and localized surface plasmon resonances. High refractive index nanoparticles. Electric and magnetic resonances.	x			Previous reading and revision of class materials.	1,5	

	6	Examples of simulation of light scattering of nanoparticles		x		Exercises, using a numerical tool, to simulate the optical response of nanoparticles.	1,5	
	7	**Non-linear nanophotonics.** Second and third harmonic generation and their applications.	x			Previous reading and revision of class materials.	1,5	20
	8	**Photonic Crystal and nanostructured optical fibers**	X			Previous reading and revision of class materials.	1,5	
	9	**Single photon emitters**. Nanoparticles and quantum dots.	x			Previous reading and revision of class materials.	1,5	
	10	Experimental Demonstration		x		Answer questions about the experimental set-ups, the optical behavior of the samples and the operation mode of the devices.	1,5	
	11	**Metamaterials.** Engineered optical properties. Left-handed materials and artificial magnetism.	x			Previous reading and revision of class materials.	1,5	
	12	**Nanophotonics at the Marketplace**. Applications of Nanophotonics in different fields.	x			Previous reading and revision of class materials.	1,5	
	13	**Nanophotonics Workshop I**		x		Presentation and discussion of the student's works.	1,5	
						Subtotal 1	**21**	**34**
						Total 1 *(Hours of class plus student homework hours between weeks 1-7)*	**55**	

[1] **A maximum of 1-2 lab sessions**

		Tutorials, handing in, etc				Solving any remaining question	10	
	15	Assessment				Studying the documentation for the final assessment.	3	7
						Subtotal 2	**3**	**17**
						Total 2 *(Hours of class plus student homework hours at week 8)*	**20**	

	TOTAL *(Total 1 + Total 2)*	**75**