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

COURSE: INTRODUCTION TO BIOMEDICAL IMAGING (15558)		
DEGREE: BIOMEDICAL ENGINEERING	YEAR: 2020/2021	TERM: 1st Term

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	Intro to Med. Imaging - Group work		X		Introduction to Medical Imaging, course objectives,main sections. Group work on MRI/PET/CT/Ultrasound. Face-to-face teaching in small group	1.66	5.0
	2	Introductory discussion on Biomedical project		X		The groups for the biomedical project will be formed, and first ideas shared. Face-to-face teaching in small group.	1.66	
2	3	Principles of Light Propagation - No light emission	X			Principles of light propagation: scattering and absorption. Online teaching.	1.66	5.0
	4	Basic optics	X			Waves, frequency, amplitude, interference. Online teaching.	1.66	
3	5	Intro to Microscopy - Widefield microscopy, resolution and NA	X			Introduction to microscopy. Online teaching.	1.66	5.0

3	6	LAB I		X	LAB	Fluorescence, polymerization, diffraction, lenses, prisms I. Small group laboratory session.	1.66	5.0
4	7	Principles of Light Propagation - Light emission	X			Introduction to fluorescence. Online teaching.	1.66	5.0
	8	LAB II		X	LAB	Fluorescence, polymerization, diffraction, lenses, prisms II. Small group laboratory session.	1.66	
5	9	Fluorescence, doing the equations	X			Derivation on fluorescence, fluorescence lifetime. Online teaching.	1.66	5.0
	10	LAB III		X	Computer	ImageJ - Cells segmentation. Small group computer session.	1.66	
6	11	Discussion on biomedical project research		X		Discussion on the biomedical project, work on the canvas and SWOT table. Talk guidelines. Face-to-face teaching in small group	1.66	5.0
	12	LAB IV		X	LAB	Microscopy, polarization, cameras I. Small group laboratory session.	1.66	
7	13	Fluorescence, advanced microscopy	X			Confocal microscopy, TIRF, Super-resolution, STED, PALM, STORM. Online teaching.	1.66	5.0
	14	LAB V		X	LAB	Microscopy, polarization, cameras II. Small group laboratory session.	1.66	
8	15	Mid-term exam	X			Continuous evaluation exam. In small groups sessions or online exam.	1.66	5.0
	16	LAB VI: Milk experiment		X	LAB	Milk experiment. Small group laboratory session.	1.66	
9	17	Imaging: From cells to whole animals I	X			Overview of the effectof scattering and how it affects imaging. Online teaching.	1.66	5.0
	18	Talk group 1, talk group 2		X		Presentations of Groups 1 and 2 on a topic related to their biomedical imaging project. Small group presentations session	1.66	

10	19	Imaging: From cells to whole animals II	X			In relation to imaging from cells to whole animals, how sources of contrast can be created in-vivo. Online teaching.	1.66	5.0
	20	Talk group 3, talk group 4		X		Presentations of Groups 3 and 4 on a topic related to their biomedical imaging project. Small group presentations session	1.66	
11	21	Molecular imaging approaches	X			Different molecular imaging modalities and their sources of contrast: MRI, PET, CT, Ultrasound, Optical. Online teaching.	1.66	5.0
	22	Transfer function, light propagation in diffuse media	X			The transfer function and its effect on resolution. Light propagation through diffuse media. Online teaching.	1.66	
12	23	Imaging in diffuse media I	X			Surface optical imaging. Online teaching.	1.66	5.0
	24	Imaging in diffuse media II	X			Deep tissue optical imaging. Online teaching.	1.66	
13	25	Presentation of research projects. Elevator Pitch		X		Biomedical projects presented in groups. An elevator pitch will be presented first (1 minute per group) and then 20 minutes each group for the overall project. Small	1.66	5.0
	26	Presentation of research projects II		X		Biomedical projects presented in groups. Small group pressentations session.	1.66	
14	27	Ultrasound imaging and photoacoustics	X			Basics of ultrasound imaging, sources of contrast and microbubbles. Introduction to photoacoustics, preclinical and clinical perspectives. Online teaching	1.66	5.0
	28	Overview, questions and preparation for final exam		X		Overview of the course and preparation for the final exam. Face-to-face teaching in small group.	1.66	
	29	Continuos evaluation final exam		X		Continuous evaluation final exam. In small groups sessions or online exam.	1.66	
						Subtotal 1	**48**	**70**
						Total 1 *(Hours of class plus student homework)*	**118**	

15		Tutorials, handing in, etc					12.0	-
16								
17		Assessment					3	

18								
						Subtotal 2	**15**	**0**
						Total 2 *(Hours of class plus student homework)*	**15**	

TOTAL (*Maximun 160 horas*)	**133**