Goi Eskola Politeknikoa Escuela Politécnica Superior

[MMA104] MICR	OFLUIDICS A	ND NUMERIC	AL SIMUI	LAT	ON		
	GENERAL IN	FORMATION					
Studies MASTER'S DEGREE IN BION	MEDICAL	Subject	?				
Semester 1 Co	ourse 1	Mention / Field of	???				
Character OPTIONAL	dality Easo to face	Specialisation					
Credits 3 Hours	week 2.63	Total hours	47.3 class hou	urs + 2	7.7 non	-class ho	urs = 75 t
	100K 2.00		hours				ulo – <u>re c</u>
MARTIN MAYOR, ALAIN ERRARTE YARZA, ANE	PROFE	SSORS					
RE			GE				
			Knov	viedge		rod	
OID MECHANICS AND HEAT TRANSPER			NO PIEVIOUS KII	Jwieug	e requi	ieu)	
FARNING RESULTS	LEANNING			кс	SK	AB	ECTS
WRA17 - Designing microdevices for different a	pplications and runnir	ng numerical simulation	ons in line with		x		2,1
litable modelling patterns MRA26 - To apply the knowledge acquired and	your problem-solving	skills in new, little-kn	own or		x		0,72
anging environments within broader (or multid MRA28 - To communicate your conclusions an specialized and non-specialized audiences in	isciplinary) contexts re d the knowledge and a clear and unambigu	elated to your area of ultimate reasons that lous way	study support them		x		0,18
		,				-	
C: Knowledge or Content / SK: Skills / AB: Abilities						Total:	3
			CH		NCH	T	,
Development and writing of records, reports	presentations audiovi	sual material etc. on	1.3 h		7 h	21	1
projects/work experience/challenges/case stu individually and/or in teams	dies/experimental invo	estigations carried out	1,5 11.		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	21	
EVALUATION SYSTEM	W	MAKE-UP MECH	ANISMS				
Reports on the completion of exercises, case computer exercises, simulation exercises, lab exercises, term projects, challenges and prob	studies, ^{50%} oratory lems	Observation (tech	nical capacity,	attitude	e and p	articipatio	on)
Presentation and defence of exercises, case a computer practical work, simulation practical laboratory practical work, term projects, end of project, master's thesis, challenges and problem	studies, ^{50%} work, if degree ems						
:H - Class hours: 1,3 h. ICH - Non-class hours: ,7 h.							
TH - Total hours: 2 h.							
FH - Total hours: 2 h. RMM137 [!] Realizar estudios de dinámica	de fluidos compute	rizada desde la defir	iición del moc	lelo ha	nsta el j	oostproc	esado

LEARNING ACTIVITIES	СН	NCH	ТН
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	3 h.	5 h.	8 h.
Computer simulation exercises, individually and/or in teams	9,5 h.	5,75 h.	15,25 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and	3 h.		3 h.

Course: 2024 / 2025 - Course planning

Escuela Politécnica Superior procedures associated with the subjects **EVALUATION SYSTEM** w MAKE-UP MECHANISMS 100% Reports on the completion of exercises, case studies, computer Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, simulation exercises, laboratory exercises, term projects, challenges and problems exercises, term projects, challenges and problems CH - Class hours: 15,5 h. NCH - Non-class hours: 10,75 h. TH - Total hours: 26,25 h. RMM145 [!] Conoce y es capaz de aplicar las herramientas de resolución de problemas en el campo de la Ingeniería Biomédica con iniciativa, toma de decisiones, creatividad y razonamiento crítico. СН NCH ΤН LEARNING ACTIVITIES 3,5 h 5,5 h. 9 h. Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams w **EVALUATION SYSTEM** MAKE-UP MECHANISMS 40% Individual written and/or oral tests or individual Observation (technical capacity, attitude and participation) coding/programming tests Co-assessment 5% Prototype / Product 55% Comments: If the score of the defense is lower than 5, this evaluation item will be evaluated in its entirety (%100) with the score of the defense. A co-evaluation system will be implemented to adjust the score of the student based on his or her participation in the Project. CH - Class hours: 5,5 h. NCH - Non-class hours: 3,5 h. TH - Total hours: 9 h. RMM144 [!] Analiza las variables intervinientes en la solución de los problemas y plantea acciones para lograr una situación estable asumiendo responsabilidades en el equipo de trabajo, afrontando contingencias y organizando y planificando tareas.

LEARNING ACTIVITIES			СН	NCH	ТН	
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams		utions to problems in n teams	5,5 h.	3,5 h.	9 h.	
EVALUATION SYSTEM	W	MAKE-UP MECHANIS	SMS			
Individual written and/or oral tests or individual coding/programming tests	40%	Observation (technical	l capacity, att	itude and par	ticipation)	
Co-assessment	5%					
Prototype / Product	55%					
Comments: If the score of the defense is lower than 5, th evaluation item will be evaluated in its entirety (%100) with the of the defense. A co-evaluation system will be implemented adjust the score of the student based on his or her participate the Project.	iis he score to tion in					
CH - Class hours: 5,5 h. NCH - Non-class hours: 3,5 h. TH - Total hours: 9 h.						

RMM146 [!] Define el problema, el desarrollo de la solución, así como las conclusiones de manera eficaz, argumentando y

LEARNING ACTIVITIES			СН	NCH	TH
Development and writing of records, reports, presentatic projects/work experience/challenges/case studies/exper individually and/or in teams	ns, audiovi imental inve	sual material, etc. on estigations carried out	1,5 h.	1 h.	2,5 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANI	SMS		
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	50%	Observation (technica	I capacity, att	itude and par	ticipation)
Presentation and defence of exercises, case studies, computer practical work, simulation practical work,	50%				

LEARNING ACTIVITIES			СН	NCH	тн
Conducting tests, giving presentations, presenting defence checkpoints	es, taking	examinations and/or doi	ng ^{2 h.}	4 h.	6 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects			6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams			7 h.	4,25 h.	11,25 h.
Practical work in workshops and/or laboratories, individually and/or in teams		3 h.		3 h.	
Practical work in workshops and/or laboratories, individua	any anu/or i	ii leans			
Practical work in workshops and/or laboratories, individua EVALUATION SYSTEM	w	MAKE-UP MECHAN	SMS		

CONTENTS

1.- MICROFLUIDICS

- 1.1 Introduction to microfluidics
- 1.2 Relevant dimensionless numbers
- 1.2 Flow control mechanisms
- 1.3.- Transport phenomena

1.4 - Other handling mechanisms: Mixing and separation

1.5.- Manufacturing techniques for microfluidic microdevices.

1.6.- Applications in biomedicine

2.- ADVANCED COMPUTATIONAL FLUID DYNAMICS (CFD)

2.1.- Guidelines for correct modeling

2.2.- CFD modeling in microdevices and biological systems

LEARNING RESOURCES AND BIBLIOGRAPHY			
Learning resources	Bibliography		
Subject notes	Çengel, Yunus A. Fluid mechanics : fundamentals and applications,		
Technical articles	1st ed, McGraw-Hill ISBN 0–07–247236–7		
Moodle Platform			
Lab practical training			
Class presentations			