Goi Eskola Politeknikoa Escuela Politécnica Superior Course: 2024 / 2025 - Course planning

[GFA005] MATHEMATICAL METHODS APPLIED TO PHYSICS **GENERAL INFORMATION** Studies ENGINEERING PHYSICS APPLIED TO Subject Mathematics INDUSTRY Semester 2 Mention / Field of Course 2 Character COMPULSORY specialisation Plan 2022 Modality Face-to-face Language EUSKARA/ENGLISH Total hours 74 class hours + 38.5 non-class hours = 112.5 total Credits 4,5 Hours/week 0 hours 2030 AGENDA GOALS 8 DEC Ń PROFESSORS AGUIRRE ALONSO, MIKEL TELLERIA ALLIKA, XABIER REQUIRED PREVIOUS KNOWLEDGE Knowledge Subjects (No specific previous subjects required) (No previous knowledge required) LEARNING RESULTS LEARNING RESULTS кс sĸ AB ECTS GFR109 - Solving any mathematical problems that may arise in engineering. Aptitude in applying 4.02 x knowledge of: differential equations in partial derivatives and their analytical and numerical solution G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, x 0,24 becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and/or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy 0.24 G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and x coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language 4.5 Total: KC: Knowledge or Content / SK: Skills / AB: Abilities SECONDAR EARNING 2RGF293 (2 sem) СН NCH ΤН LEARNING ACTIVITIES Development and writing of records, reports, presentations, audiovisual material, etc. on 2 h. 2 h. projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams **EVALUATION SYSTEM** w MAKE-UP MECHANISMS Presentation and defence of exercises, case studies, 100% (No mechanisms) computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems CH - Class hours: 0 h. NCH - Non-class hours: 2 h. TH - Total hours: 2 h. 2RGF294 [!] (2 sem)Realiza una presentación oral del proyecto con argumentos elaborados por sí mismos y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje. LEARNING ACTIVITIES СН NCH ΤН

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perior						
Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual			1 h.	1 h.	2 h.	
EVALUATION SYSTEM	W	MAKE-UP MECHA	NISMS			
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%		(No mech	anisms)		
CH - Class hours: 1 h. NCH - Non-class hours: 1 h. IH - Total hours: 2 h.						
<b>RGF222</b> [!] Identifica los diferentes tipos de ecuacion numérica.	es en deri	ivadas parciales y col	noce los méto	dos para bus	scar una soluc	
LEARNING ACTIVITIES			СН	NCH	тн	
Computer simulation exercises, individually and/or in tean	ns		10 h.	10 h.	20 h.	
Presentation by the teacher in the classroom, in participat procedures associated with the subjects	ory classe	s, of concepts and	16 h.		16 h.	
EVALUATION SYSTEM	W	MAKE-UP MECHA	NISMS			
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree	80%	Individual written and/or oral tests or individual coding/programming tests				
NCH - Non-class hours: 10 h.						
CH - Class hours: 26 h. NCH - Non-class hours: 10 h. I'H - Total hours: 36 h.						
CH - Class hours: 26 h. NCH - Non-class hours: 10 h. I'H - Total hours: 36 h.						
CH - Class hours: 26 h. ICH - Non-class hours: 10 h. TH - Total hours: 36 h. 2RGF291 (2 sem) LEARNING ACTIVITIES			сн	лсн	тн	
CH - Class hours: 26 h. ICH - Non-class hours: 10 h. IH - Total hours: 36 h. 2RGF291 (2 sem)			СН	<u>NCH</u> 3 h.	<u>ТН</u> 3 h.	
CH - Class hours: 26 h. ICH - Non-class hours: 10 h. 'H - Total hours: 36 h. 2RGF291 (2 sem) LEARNING ACTIVITIES Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual EVALUATION SYSTEM	lly and/or ii <i>w</i>		NISMS	3 h.		
CH - Class hours: 26 h. NCH - Non-class hours: 10 h. TH - Total hours: 36 h. 2RGF291 (2 sem) LEARNING ACTIVITIES Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual	lly and/or ii	n teams		3 h.		
<ul> <li>CH - Class hours: 26 h.</li> <li>ICH - Non-class hours: 10 h.</li> <li>TH - Total hours: 36 h.</li> <li><b>2RGF291</b> (2 sem)</li> <li><b>LEARNING ACTIVITIES</b></li> <li>Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual <b>EVALUATION SYSTEM</b></li> <li>Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems</li> <li>CH - Class hours: 0 h.</li> <li>ICH - Non-class hours: 3 h.</li> </ul>	lly and/or ii <i>w</i>	n teams	NISMS	3 h.		
<ul> <li>CH - Class hours: 26 h.</li> <li>ICH - Non-class hours: 10 h.</li> <li>TH - Total hours: 36 h.</li> <li><b>2RGF291</b> (2 sem)</li> <li><b>LEARNING ACTIVITIES</b></li> <li>Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual <b>EVALUATION SYSTEM</b></li> <li>Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems</li> <li>CH - Class hours: 0 h.</li> <li>ICH - Non-class hours: 3 h.</li> </ul>	lly and/or ii <i>w</i>	n teams	NISMS	3 h.		
<ul> <li>CH - Class hours: 26 h.</li> <li>CH - Non-class hours: 10 h.</li> <li>TH - Total hours: 36 h.</li> <li><b>2RGF291</b> (2 sem)</li> <li><b>LEARNING ACTIVITIES</b></li> <li>Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual <b>EVALUATION SYSTEM</b></li> <li>Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems</li> <li>CH - Class hours: 0 h.</li> <li>NCH - Non-class hours: 3 h.</li> <li>TH - Total hours: 3 h.</li> </ul>	lly and/or ii <i>w</i>	n teams	NISMS	3 h.		
<ul> <li>CH - Class hours: 26 h.</li> <li>NCH - Non-class hours: 10 h.</li> <li>TH - Total hours: 36 h.</li> <li><b>2RGF291</b> (2 sem)</li> <li><b>LEARNING ACTIVITIES</b></li> <li>Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual <b>EVALUATION SYSTEM</b></li> <li>Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems</li> <li>CH - Class hours: 0 h.</li> <li>NCH - Non-class hours: 3 h.</li> <li>TH - Total hours: 3 h.</li> </ul>	lly and/or ii <i>w</i>	n teams	NISMS	3 h.		
CH - Class hours: 26 h. NCH - Non-class hours: 10 h. TH - Total hours: 36 h. 2RGF291 (2 sem) LEARNING ACTIVITIES Carrying out/resolving projects/challenges/cases, etc. to p interdisciplinary contexts, real and/or simulated, individual EVALUATION SYSTEM Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory	lly and/or ii <i>w</i>	n teams	NISMS	3 h.		

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Self-assessment					
	25%		(No mecha	anisms)	
Co-assessment	25%				
Observation (technical capacity, attitude and participation)	50%				
CH - Class hours: 0 h. NCH - Non-class hours: 3 h. IFH - Total hours: 3 h.					
2RGF292 (2 sem)					
LEARNING ACTIVITIES			СН	NCH	тн
Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams				2 h.	2 h.
EVALUATION SYSTEM	W	MAKE-UP MECHA			
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%		(No mecha	anisms)	
<b>RG5221</b> [!] Identifica los diferentes tipos de ecuaciones u resolución analítica.	s en deri	ivadas parciales y co	noce y aplica i	las diferentes	técnicas para
RGF221 [!] Identifica los diferentes tipos de ecuaciones su resolución analítica. LEARNING ACTIVITIES	s en deri	ivadas parciales y co	noce y aplica i сн	las diferentes NCH	técnicas para TH
u resolución analítica. LEARNING ACTIVITIES	, audiovis	sual material, etc. on			
LEARNING ACTIVITIES Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime	, audiovis ental inve	sual material, etc. on stigations carried out	сн	псн	тн
LEARNING ACTIVITIES Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams Conducting tests, giving presentations, presenting defences checkpoints Presentation by the teacher in the classroom, in participator	, audiovis ental inve s, taking (	sual material, etc. on stigations carried out examinations and/or d	сн	псн	<b>TH</b> 9,5 h.
LEARNING ACTIVITIES Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams Conducting tests, giving presentations, presenting defences checkpoints	, audiovis ental inve s, taking ( ry classes	sual material, etc. on stigations carried out examinations and/or d s, of concepts and	CH oing <sup>2 h.</sup>	псн	<b>тн</b> 9,5 h. 2 h.
LEARNING ACTIVITIES Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams Conducting tests, giving presentations, presenting defences checkpoints Presentation by the teacher in the classroom, in participator procedures associated with the subjects	, audiovis ental inve s, taking ( ry classes	sual material, etc. on stigations carried out examinations and/or d s, of concepts and	CH oing 2 h. 30 h. 15 h.	<b>NCH</b> 9,5 h.	<b>TH</b> 9,5 h. 2 h. 30 h.
LEARNING ACTIVITIES Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams Conducting tests, giving presentations, presenting defences checkpoints Presentation by the teacher in the classroom, in participator procedures associated with the subjects Carrying out exercises and solving problems individually and	, audiovis ental inve s, taking o ry classe: nd/or in te	sual material, etc. on stigations carried out examinations and/or d s, of concepts and eams	CH oing 2 h. 30 h. 15 h. NISMS	<i>NCH</i> 9,5 h. 8 h.	<b>TH</b> 9,5 h. 2 h. 30 h.
LEARNING ACTIVITIES         Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams         Conducting tests, giving presentations, presenting defences checkpoints         Presentation by the teacher in the classroom, in participator procedures associated with the subjects         Carrying out exercises and solving problems individually an         EVALUATION SYSTEM         Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems         Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree	, audiovis ental inve s, taking o ry classe nd/or in te	sual material, etc. on stigations carried out examinations and/or d s, of concepts and eams <u>MAKE-UP MECHA</u> Individual written an	CH oing 2 h. 30 h. 15 h. NISMS	<i>NCH</i> 9,5 h. 8 h.	<b>тн</b> 9,5 h. 2 h. 30 h.
Development and writing of records, reports, presentations, projects/work experience/challenges/case studies/experime individually and/or in teams Conducting tests, giving presentations, presenting defences checkpoints Presentation by the teacher in the classroom, in participator procedures associated with the subjects Carrying out exercises and solving problems individually an <b>EVALUATION SYSTEM</b> Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems Presentation and defence of exercises, case studies, computer practical work, simulation practical work,	, audiovis ental inve s, taking o ry classe: nd/or in te <u>w</u> 20%	sual material, etc. on stigations carried out examinations and/or d s, of concepts and eams <u>MAKE-UP MECHA</u> Individual written an	CH oing 2 h. 30 h. 15 h. NISMS	<i>NCH</i> 9,5 h. 8 h.	<b>тн</b> 9,5 h. 2 h. 30 h.

### CONTENTS

1. Partial Differential Equations



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Learning resources

- Introduction

- Types of PDE's
- 2. Numerical methods
- Initial value problems
- Boundary value problems
- 3. Equations of mathematical physics
- Laplace
- Heat equation
- Wave equation
- Schrödingerequation

#### LEARNING RESOURCES AND BIBLIOGRAPHY

Subject notes Moodle Platform Bibliography https://labur.eus/QlzUS