[GBB203] PHYSICS II

GENERAL INFORMATION

Studies	DEGREE IN BIOMEDICAL ENGINEERING			**Subject**	PHYSICS
Semester	2	**Course**	2	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	EUSKARA
Credits	3	**Hours/week**	2.39	**Total hours**	43 class hours + 32 non-class hours = **75 total hours**

PROFESSORS

BARRUTIA INZA, IBAN

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MATHEMATICS II	*(No previous knowledge required)*
PHYSICS II	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GBR213 - To apply the principles of electromagnetism to problems in the field of Biomedical Engineering		*x*		2,6
G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - 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		*x*		0,16
G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		*x*		0,24
			Total:	3

KC: Knowledge or Content / SK: Skills / AB: Abilities

SECONDARY LEARNING RESULTS

RGB290 **[!]** ***Proponer los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías propias de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrategia de aprendiz***

LEARNING ACTIVITIES	CH	NCH	TH
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	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

RGB291 **[!]** ***Establecer las responsabilidades de los miembros del equipo utilizando técnicas adecuadas para fomentar la eficiencia del equipo para el desarrollo del proyecto en los plazos establecidos (compartir recursos, aportar ideas, habilidades comunicativas***

LEARNING ACTIVITIES	CH	NCH	TH
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	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS

Self-assessment	25%	Observation (technical capacity, attitude and participation)
Co-assessment	25%	
Observation (technical capacity, attitude and participation)	50%	

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

RGB293 **[!]** ***Redacta y estructura correctamente la memoria del proyecto, haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje. Para ello, busca y hace uso de las fuentes de información adecuadas.***

LEARNING ACTIVITIES	CH	NCH	TH
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	1 h.	2 h.	3 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

CH - Class hours: 1 h.
NCH - Non-class hours: 2 h.
TH - Total hours: 3 h.

RGB294 **[!]** ***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	CH	NCH	TH
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	1 h.	2 h.	3 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	100%	Observation (technical capacity, attitude and participation)

CH - Class hours: 1 h.
NCH - Non-class hours: 2 h.
TH - Total hours: 3 h.

RGB228 **[!]** ***Comprende y aplica las ecuaciones de Maxwell***

LEARNING ACTIVITIES	CH	NCH	TH
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	8 h.	4 h.	12 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		5 h.	5 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.		1 h.
Computer simulation exercises, individually and/or in teams	1 h.	2 h.	3 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	14 h.		14 h.
Carrying out exercises and solving problems individually and/or in teams		5 h.	5 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	5%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	90%	
Prototype / Product	5%	

CH - Class hours: 24 h.
NCH - Non-class hours: 16 h.
TH - Total hours: 40 h.

RGB229 **[!]** ***Comprende y aplica los fundamentos de propagación de ondas electromagnéticas***

LEARNING ACTIVITIES	CH	NCH	TH
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	5 h.	3 h.	8 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		5 h.	5 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Computer simulation exercises, individually and/or in teams	1 h.	2 h.	3 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	7 h.		7 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	5%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	90%	
Prototype / Product	5%	

CH - Class hours: 15 h.
NCH - Non-class hours: 10 h.
TH - Total hours: 25 h.

CONTENTS

1. Vector analysis

1.1. Gradient

1.2. Dibergence

1.3. Curl

1.4. Laplacian

2. Maxwell equations

2.1. Gauss law for electric field

2.2. Gauss law for magnetic field

2.3. Ampere law

2.4. Faraday law

3. Propagation of electromagnetic waves

3.1. Propagation in vacuum

3.2. Propagation in lossless media

3.3. Propagation in lossy media

3.4. Fresnel equations

3.5. Scattering

4. FDTD (Finite Differences Time Domain)

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Moodle Platform Class presentations Subject notes Topic related web quires	David K. Cheng. Fundamentos de electromagnetismo para ingeniería Markus Zahn, Electromagnetic Field Theory: A Problem Solving Approach. (Massachusetts Institute of Technology: MIT OpenCourseWare) Rafael Boloix Tortosa. Problemas de ondas planas y medios de transmisión Rodrigo Chi Duran. Problemas Propuestos y Resueltos de Electromagnetismo