[GFC009] Optics and Artificial Vision

GENERAL INFORMATION

Studies	DEGREE IN ENGINEERING PHYSICS APPLIED TO INDUSTRY			**Subject**	Physics
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	ENGLISH
Credits	4,5	**Hours/week**	0	**Total hours**	67 class hours + 45.5 non-class hours = **112.5 total hours**

2030 AGENDA GOALS

PROFESSORS

URTASUN MARCO, BEÑAT

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
CALCULUS I	[!] *Taylor series approximation*
LINEAR ALGEBRA	[!] *Calculus, complex variables.*
ELECTROMAGNETISM I	[!] *Wave propagation.*
Programming I	[!] *Electromagnetism.*
	[!] *Programming skills.*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR208 - To know and understand the physical phenomena of optics, and use them to design and test a machine vision solution for image analysis, using modeled optical instruments	x	x		3,78
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		0,4
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		0,32
			Total:	4,5

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

SECONDARY LEARNING RESULTS

2RGF392 **[!]** ***(2 sem)Identificar y argumentar de forma precisa los ODS en los que incide el proyecto realizado, aportando posibles acciones para la mejora.***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	2 h.	3 h.

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

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

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

RGF317 **Designs an image analysis solution based on basic fundamentals of machine vision and the fundamentals of optical instrumentation learnt in the course**

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	7 h.	10 h.	17 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	18 h.		18 h.
Carrying out exercises and solving problems individually and/or in teams	3 h.	7 h.	10 h.
Practical work in workshops and/or laboratories, individually and/or in teams	3 h.		3 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	50%
Individual written and/or oral tests or individual coding/programming tests	50%

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

CH - Class hours: 31 h.
NCH - Non-class hours: 17 h.
TH - Total hours: 48 h.

2RGF391 **[!]** ***(2 sem)Coordinar el equipo de trabajo, estimulando la cohesión y clima para lograr la integración de todas las personas y su contribución para alcanzar un rendimiento apropiado, a nivel individual como grupal, para el desarrollo del proyecto en clase***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	2 h.	3 h.

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

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

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

2RGF394 **[!]** ***(2 sem)Realiza una presentación oral del proyecto, justificando las soluciones propuestas con argumentos elaborados y precisos, y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	3 h.	1 h.	4 h.

EVALUATION SYSTEM	W
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%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 3 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 4 h.

RGF316 **Knows, understands and models the phenomena and physical theories in the field of optics and applies them to practical solutions**

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	5 h.	9,5 h.	14,5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	17 h.		17 h.
Carrying out exercises and solving problems individually and/or in teams	2 h.	8 h.	10 h.
Practical work in workshops and/or laboratories, 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	50%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	50%	

CH - Class hours: 29 h.
NCH - Non-class hours: 17,5 h.
TH - Total hours: 46,5 h.

2RGF390 **[!]** ***(2 sem)Definir y gestionar los objetivos y planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías - llegando en ocasiones a la vanguardia del conocimiento- y definir una estrategia de autoaprendizaje eficaz***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	3 h.	4 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	85%	*(No mechanisms)* **Comments:** Continuous assessment. Retake is not foreseen.
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	15%	

CH - Class hours: 1 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 4 h.

2RGF393 **[!]** ***(2 sem)Elabora la memoria del proyecto, aportando argumentos elaborados y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	3 h.	4 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%	*(No mechanisms)* **Comments:** Continuous assessment. Retake is not foreseen.

CH - Class hours: 1 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 4 h.

CONTENTS

1. Fundamentals of Geometrical Optics
2. The Coherence of Light
3. The Classical Oscillator Model
4. Optical Phenomena at Interfaces
5. Light Interference
6. Analysis, Transformation, and Synthesis of the Optical Field

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
[!] *Plataforma Moodle*	https://labur.eus/3QJnz
[!] *Apuntes de la asignatura*	
[!] *Laboratorios*	
[!] *Realización de prácticas en laboratorio*	
[!] *Realización de prácticas en ordenador*	
[!] *Transparencias de la asignatura*	