[GFK003] Artificial Intelligence: Machine Learning

GENERAL INFORMATION

Studies	DEGREE IN ENGINEERING PHYSICS APPLIED TO INDUSTRY			**Subject**	Key Technologies
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	4,5	**Hours/week**	0	**Total hours**	68 class hours + 44.5 non-class hours = **112.5 total hours**

2030 AGENDA GOALS

PROFESSORS

CERNUDA GARCIA, CARLOS

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
FOUNDATIONS OF COMPUTER SCIENCE Programming I	*(No previous knowledge required)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR210 - To design and implement data preprocessing techniques and training of models based on preprocessed data for prediction or clustering, being able to interpret and validate all phases of the process, conceived for knowledge extraction from data.		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	2 h.	1 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: 2 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 3 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	2 h.	1 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: 2 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 3 h.

RGF323 **Designs and implements predictive or clustering models based on data, being able to interpret and validate the models created for knowledge extraction.**

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Computer simulation exercises, individually and/or in teams	5 h.	10 h.	15 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	5 h.	9 h.	14 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	25%
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%
Individual written and/or oral tests or individual coding/programming tests	60%

MAKE-UP MECHANISMS

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

CH - Class hours: 29 h.
NCH - Non-class hours: 19 h.
TH - Total hours: 48 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	2,5 h.	1,5 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: 2,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 4 h.

RGF322 **Designs and implements machine learning oriented data preprocessing techniques, being able to validate their suitability for subsequent training of predictive or clustering models.**

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Computer simulation exercises, individually and/or in teams	5 h.	10 h.	15 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	15 h.		15 h.
Carrying out exercises and solving problems individually and/or in teams	5,5 h.	9 h.	14,5 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	25%
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%
Individual written and/or oral tests or individual coding/programming tests	60%

MAKE-UP MECHANISMS

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

CH - Class hours: 27,5 h.
NCH - Non-class hours: 19 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	2,5 h.	1,5 h.	4 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	85%
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%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 2,5 h.
NCH - Non-class hours: 1,5 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	2,5 h.	1,5 h.	4 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: 2,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 4 h.

CONTENTS

1. Introduction to Artificial Intelligence
    1. Data Types and Problem Categories in Artificial Intelligence
    2. Machine Learning and Deep Learning Concepts
    3. Concept of Explainability
2. Machine Learning
    1. Data Preprocessing
    2. Model Training
    3. Model Validation
    4. Model Selection
3. Deep Learning
    1. Deep Neural Networks
    2. Convolutional Neural Networks (CNN)
    3. Recurrent Neural Networks (RNN)
4. Explainable Artificial Intelligence (XAI)
    1. Local Explainability
    2. Global Explainability
5. Impact of Artificial Intelligence on Society (SDGs)

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
[!] *Transparencias de la asignatura*	https://labur.eus/Bfajl
[!] *Presentaciones en clase*	
[!] *Realización de prácticas en ordenador*	