[MRB002] DEEP LEARNING

GENERAL INFORMATION

Studies	Master's Degree in ROBOTICS AND CONTROL SYSTEMS			**Subject**	Artificial Intelligence
Semester	2	**Course**	1	**Mention / Field of specialisation**	AUTONOMOUS SYSTEMS - EIT
Character	OPTIONAL				
Plan	2019	**Modality**	Adapted Face-to-face	**Language**	ENGLISH
Credits	3	**Hours/week**	0	**Total hours**	20 class hours + 55 non-class hours = **75 total hours**

PROFESSORS

ECIOLAZA ECHEVERRIA, LUKA

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
DATA ANALYTICS	*(No previous knowledge required)*

SKILLS

VERIFICA SKILLS

SPECIFIC

MRCE10 - Designing, developing and implementing an advanced data analysis process to respond to the nature of the data and the objective of the task to be executed.

GENERAL

MRCG01 - Automating, controlling, maintaining and providing intelligence to industrial processes and autonomous systems while directing innovative projects that guarantee their availability, using and integrating cutting-edge technologies in both industrial and scientific environments, with the ability to deliver advice on the most appropriate alternatives considering the specifications of users and current regulations

CROSS

MRCTR1 - Ability to work in multidisciplinary teams and in a multilingual environment and to communicate, both orally and in writing, knowledge, procedures, results and ideas related to subjects related to the Master's degree

BASIC

M_CB8 - To be able to integrate different types of knowledge and make complex judgements based on information that, in spite of being partial or limited, includes ideas on the social and ethical responsibilities associated with the application of knowledge

LEARNING RESULTS

RA101 Identifies the concepts of advanced data analysis and preprocessing

LEARNING ACTIVITIES	*CH*	*NCH*	*TH*
Individual study and work, tests and evaluations and check points	12 h.	18 h.	30 h.

EVALUATION SYSTEM	*W*
Individual written and oral tests to assess technical skills of the subject	100%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

Comments: All activities (control points, individual and group work, etc.) must have a minimum grade of 5 and an opportunity for recovery (except the PBL). In unapproved training activities (less than 5) the recovery is compulsory and the final grade will be the grade obtained in the recovery. In the activities carried out it is necessary to obtain a minimum mark of 4 to calculate the average mark of the learning result. Otherwise, the note of the learning result will be that of the suspended activity. The system will calculate the final grade with the RA, applying the percentages defined in IKOF.

CH - Class hours: 12 h.
NCH - Non-class hours: 18 h.
TH - Total hours: 30 h.

RA102 Proposes and develops solutions based on data analysis using the concepts of advanced machine learning, communicating the conclusions in a reasoned way in a second language

LEARNING ACTIVITIES	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams		25 h.	25 h.
Individual and team solving of exercises, problems, and practices	8 h.	12 h.	20 h.

EVALUATION SYSTEM	W
Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices	50%
Team oral tests for the evaluation of technical skills of the subject	50%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

Comments: All activities (control points, individual and group work, etc.) must have a minimum grade of 5 and an opportunity for recovery (except the PBL). In unapproved training activities (less than 5) the recovery is compulsory and the final grade will be the grade obtained in the recovery. In the activities carried out it is necessary to obtain a minimum mark of 4 to calculate the average mark of the learning result. Otherwise, the note of the learning result will be that of the suspended activity. The system will calculate the final grade with the RA, applying the percentages defined in IKOF.

CH - Class hours: 8 h.
NCH - Non-class hours: 37 h.
TH - Total hours: 45 h.

CONTENTS

* Introduction
* Deep Neural Networks (DNN)
* DNNs building and tuning
* Applications of DNNs

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Slides of the subject
Moodle Platform
Virtual Laboratory (Google Colab)

Bibliography

Géron, Aurélien. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. O'Reilly Media, 2019. ISBN: 9781492032649

Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep learning. MIT press, 2016. ISBN: 9780262035613