UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2023/24
Subject (*)	Machine Learning		Code	614G01038
Study programme	Grao en Enxeñaría Informática			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Third	Optional	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Computación e Tecnoloxías da InformaciónComputación			
Coordinador	Rivero Cebrián, Daniel	E-mail	daniel.rivero@udc.es	
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Web				
General description	This course presents an overview of Machine Learning. The syllabus explains the different techniques and methods, including supervised, unsupervised and reinforcement learning. In the practical part, a real case will be solved.			

Study programme competences	
Code	Study programme competences
A45	Capacidade para coñecer e desenvolver técnicas de aprendizaxe computacional e deseñar e implementar aplicacións e sistemas que as utilicen, incluídas as dedicadas á extracción automática de información e coñecemento a partir de grandes volumes de datos.
B1	Capacidade de resolución de problemas
B9	Capacidade para xerar novas ideas (creatividade)
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes			
Learning outcomes	Study programme competences		
Know the different machine learning techniques and apply them correctly.	A45 B9	B1	C2 C6 C7 C8
To be able to combine the results of different techniques.	A45 B9	B1	
To be able to correctly compare the results obtained with different techniques.	A45	B1	C2
Learn and apply the methodology of using these techniques in the resolution of real problems.	A45 B9	B1	C2 C6 C7 C8

Contents	
Topic	Sub-topic

Unit 1: Introducción	1.1. Introduction to Machine Learning 1.2. Learning Paradigms 1.3. Inductive Learning 1.4. No free Lunch Theorems
Unit 2: Supervised Learning	2.1. Introduction 2.2. Support-Vector Machines 2.3. Decision Trees and Rules 2.4. Regression. Regression Trees 2.5. Bayesian Learning 2.6. Instant-Based Learning 2.7. Artificial Neural Networks 2.8. Evaluation 2.9. Ensembles
Unit 3: Unsupervised Learning	3.1. Unsupervised learning: clustering 3.2. Unsupervised neural networks
Unit 4: Reinforcement Learning	4.1. Markov Decision Processes 4.2. Reinforcement Learning
Unit 5: Deep Learning	5.1. Introduction 5.2. Convolutional Networks 5.3. Advanced models

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A45 C7 C8	21	42	63
Laboratory practice	A45 B1 B9	12	24	36
Supervised projects	A45 C2 C6	7	19	26
Objective test	A45 C7 C8	2	20	22
Personalized attention		3	0	3
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Theoretical teaching of the subject matter of the course
Laboratory practice	Solve a practical problem by using the different techniques that will be explained in the theory classes.
Supervised projects	Writing, under the supervision of the teacher, of the report explaining the resolution of the problem carried out in the laboratory practices and the results obtained.
Objective test	This is a written assessment test in which the student must demonstrate the knowledge acquired from the subject.

Personalized attention	
Methodologies	Description
Supervised projects Laboratory practice	Practical work carried out with the advice of the teacher. Writing of the explanatory report under the teacher's supervision.

Assessment			
Methodologies	Competencies	Description	Qualification

Objective test	A45 C7 C8	Test questions about the contents of the course, based on the different computer learning techniques and their applications.	50
Supervised projects	A45 C2 C6	Writing of the report on the resolution of the real problem carried out in the laboratory practices. The writing of the report will include a bibliographic review of the most important works related, written in English for the most part, documentation on the problem to be solved, methodology used, and comparison of the results found in the application of the different techniques, as well as a critical evaluation of both the results obtained and the information used.	25
Laboratory practice	A45 B1 B9	Resolution of a real world problem using the methodology, for which several techniques explained in theory will be used, and the student will be stimulated to generate new ideas for the resolution of this problem.	25

Assessment comments
In order to pass the subject, the student must obtain a minimum score of 5 out of 10 in the result of combining the grades of the objective test, the laboratory practices and the supervised works. In addition, the student must obtain a minimum score of 2 out of 5 points in the objective test. If the student does not obtain this minimum grade, the grade of the subject will be that corresponding to the grade of the objective test. In the second opportunity, the grade obtained in the laboratory practices and supervised works will be maintained, not being able to obtain again a grade since it results from the continuous evaluation of the work during the credits of practice of the subject. The student can retake the examination of the objective test, the criteria for obtaining the total score being those indicated at the beginning of this section. Part-time students must deliver in their reports on the same dates as full-time students, and attend the RGTs in which they will be corrected. Similarly, it is recommended that they attend the practice classes. No-show qualification: The student will receive the qualification of "no-show" when he/she does not take the final exam. Fraudulent performance of exercises or tests: For cases of fraudulent performance of exercises or tests, the provisions of the current regulation of the UDC about this topic will apply.

Sources of information	
Basic	- D. Borrajo, J. González, P. Isasi (2006). Aprendizaje automático. Sanz y Torres - T.M. Mitchell (1997). Machine Learning. McGraw Hill - Basilio Sierra Araujo (2006). Aprendizaje automático: conceptos básicos y avanzados. Aspectos prácticos utilizando el software WEKA. Pearson Education - Saso Dzeroski, Nada Lavrac (). Relational Data Mining. Springer - David Aha (). Lazy Learning. Kluwer Academics Publishers - Richard Sutton, Andrew Barto (). Reinforcement Learning. An Introduction. MIT Press - Andrew Webb (2002). Statistical Pattern Recognition. Wiley - Ethem Alpaydin (2004). Introduction to Machine Learning. MIT Press
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Programming I/614G01001 Programming II/614G01006 Statistics/614G01008 Algorithms/614G01011 Intelligent Systems/614G01020
Subjects that are recommended to be taken simultaneously
Knowledge Representation and Automatic Reasoning/614G01036
Subjects that continue the syllabus

Computer Vision/614G01068 Robotics/614G01098
Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.