UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Intelligent Robotics I		Code	614544019
Study programme	Máster Universitario en Intelixencia Artificial			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatory	3
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Computación e Tecnoloxías da Información			
Coordinador	Duro Fernández, Richard José	E-mail	richard.duro@udc.es	
Lecturers	Duro Fernández, Richard José Monroy Camafreita, Juan	E-mail	richard.duro@udc.es juan.monroy@udc.es	
Web				
General description	The main objective of this subject is to provide the conceptual bases of intelligent robotics, that is, how AI techniques apply to the particular case of robots with the aim of achieving autonomous operation. All the development of the subject is based on the distinctive properties of robotics, such as operation in real environments and the existence of a physical body. Based on these premises, the subject covers fundamental aspects of sensorization, action and control, with a practical approach towards the resolution of problems autonomously by the robot.			

Study programme competences / results	
Code	Study programme competences / results
A18	CE17 - Understanding and assimilation of the capacities and limitations of intelligent robotic systems, together with the technologies supporting them
A19	CE18 - Building up the ability to choose, design and implement AI based strategies to provide robotic systems, both individual and collective, with the capacities required to perform their tasks in a suitable way, according to the goals and constraints to be taken into account
B1	CG01 - Maintaining and extending theoretical foundations to allow the introduction and exploitation of new and advanced technologies in the field of AI
B2	CG02 - Successfully addressing each and every stage of an AI project
B3	CG03 - Searching and selecting that useful information required to solve complex problems, with a confident handling of bibliographical sources in the field
B6	CB01 - Acquiring and understanding knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, frequently in a research context
B7	CB02 - The students will be able to apply the acquired knowledge and to use their capacity of solving problems in new or poorly explored environments inside wider (or multidisciplinary) contexts related to their field of study
B9	CB04 - The students will be able to communicate their conclusions, their premises and their ultimate justifications, both to specialised and non-specialised audiences, using a clear style language, free from ambiguities
C3	CT03 - Use of the basic tools of Information and Communications Technology (ICT) required for the student's professional practice and learning along her life
C5	CT05 - Understanding the importance of the entrepreneurial culture and knowledge of the resources within the entrepreneur person's means
C7	CT07 - Developing the ability to work in interdisciplinary or cross-disciplinary teams to provide proposal that contribute to a sustainable environmental, economic, political and social development
C8	CT08 - Appreciating the importance of research, innovation and technological development in the socioeconomic and cultural progress of society

Learning outcomes

Learning outcomes	Study programme competences / results		
Know the different types of robots depending on their application. Know the principles of operation of the different types of sensors and actuators adapted to the different operating environments.	AC17	BC1 BC6	CC3
Have an overview of the different possibilities and control objectives in traditional smart robots, as well as the basic technologies that can be applied.	AC18	BC3	CC8
Know how to implement, even if it is in a simplified way, examples/elements of everything seen in theory (components of a cognitive architecture, learning methods).	AC18	BC2 BC7 BC9	CC5 CC7

Contents	
Topic	Sub-topic
Elements of an Intelligent Robotic System	
Real environments, embodiment and reality gap.	
Sensing and actuation.	
Knowledge based robotics	
Behavior based robotics	

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Supervised projects	B1 B3 B9 C5 C8	2	20	22
Guest lecture / keynote speech	A18 A19 B6	10.5	10	20.5
Laboratory practice	B2 B7 C3 C7	10.5	21	31.5
Personalized attention		1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Supervised projects	Practices in which some of the techniques seen in the theoretical classes on robot simulation environments and the robotic platforms selected by the teachers of the assignment will be implemented. These works will be carried out by the students autonomously and their progress will be tutored by the teachers.
Guest lecture / keynote speech	Oral presentation by the teachers of the theoretical subject. This methodology can be hybridized with a collaborative learning methodology.
Laboratory practice	Laboratory or remote sessions using ICTs in which the characteristics of the robotic platform selected for the assignment and its programming software will be explained. In addition, these classes will be used for students to program and test in the real robot the controllers they are doing for the supervised work.

Personalized attention	
Methodologies	Description
Laboratory practice Supervised projects	A follow-up of the students will be carried out resolving doubts and discussing with them the evolution of the supervised works and assigned practices.

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Laboratory practice	B2 B7 C3 C7	See below	50

Supervised projects	B1 B3 B9 C5 C8	See below	20
Guest lecture / keynote speech	A18 A19 B6	See below	30

Assessment comments
The evaluation of the subject will consist of two distinct parts: theory (50%) and practical work (50%). The theoretical part will be evaluated through an examination that may consist of a work of analysis of scientific bibliography related to the subject of the subject, presented orally on the day of the final exam. The practical part will be evaluated from the average of the memoirs presented at the end of each practice. It will be necessary to approve the theory and practice part separately in order to approve the matter. Attendance to both theoretical and practical classes will be mandatory for the approval of the subject except in cases of justified absence. For those students who have a dispensation, the evaluation system will be the same although they will not have an obligation to attend theoretical classes. Second-chance assessment: Students must recover each suspended part (theory and practices). If one of the two parties has been approved during the first opportunity, the student may choose to save the corresponding note and only recover the suspended part. Students will be assessed as "unpresented" when they do not present the theory analysis work or any of the practice memoirs. The competences of the subject as well as the general-basic competences have specific contents in the subject that are introduced, as indicated, both in the exhibition and interactive classes. Subsequently, the students will develop these skills in the theoretical exam and with the realization of the practical work in which the cross-border competences will also work, especially with regard to the ability to use ICT tools (CT3), the understanding of entrepreneurial culture (CT5), the ability to work in a team (CT7) and the valorization of research and innovation (CT8). The specific competences will be evaluated both in the practical work that the student develops during the subject and in the theoretical exam. For cases of fraudulent performance of exercises or tests, the provisions of the "Regulation of evaluation of academic performance of students and review of qualifications" will apply.

Sources of information	
Basic	- Nikolaus Correll (2020). Introduction to Autonomous Robots. Magellan Scientific - Robin R. Murphy (2019). Introduction to AI Robotics. MIT Press https://open.umn.edu/opentextbooks/textbooks/introduction-to-autonomous-robotshttps://open.umn.edu/opentextbooks/textbooks/introduction-to-autonomous-robots
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Machine Learning I /614544012
Subjects that continue the syllabus
Intelligent Robotics II/614544020
Other comments
To help achieve an immediate sustainable environment and meet the objective of action number 5: "Healthy and sustainable environmental and social research" of the "Green Campus Ferrol Action Plan" the delivery of the documentary works that are carried out in this field: It will be requested in virtual format and/or computer support It will be made through Moodle, in digital format without the need to print them. 3. to be done on paper: Plastics will not be used. You will make good impressions on the face. Use recycled paper. Avoid the printing of drafts.

(*)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.