Teaching Guide				
Identifying Data				2022/23
Subject (*)	Computer Vision I		Code	614544017
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	Ortega Hortas, Marcos	E-mail	m.ortega@udc.es	
Lecturers	De Moura Ramos, Jose Joaquim Ortega Hortas, Marcos	E-mail	joaquim.demoura@udc.es m.ortega@udc.es	
Web				
General description	The main objective of this compulsory subject is to set the bases that the different processes for the interpretation of images entail (image formation, preprocessing, segmentation and feature detection) so that students have the minimum knowledge necessary for the application of different techniques of AI in computer vision. In addition to the study and application of fundamental techniques, practical applications of these techniques to solve real problems will be studied. This subject provides the necessary tools to apply the algorithms used in practical cases, as well as the bases to develop new algorithms and continue with the study of more advanced methods.			

Study programme competences	
Code	Study programme competences
A24	CE23 - Understanding and command of basic concepts and techniques of digital image processing
A25	CE24 - Ability to apply different techniques to computer vision problems
A26	CE25 - Knowledge and ability to design systems for detecting, classifying and tracking objects in images and video
A27	CE26 - Understanding and command of the multiple ways to represent images and signals in terms of their associated data and their main features
B1	CG01 - Maintaining and extending theoretical foundations to allow the introduction and exploitation of new and advanced technologies in the field of AI
B3	CG03 - Searching and selecting that useful information required to solve complex problems, with a confident handling of bibliographical sources in the field
B5	CG05 - Working in teams, especially of multidisciplinary nature, and being skilled in the management of time, people and decision making
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
B10	CB05 - The students will acquire learning abilities to allow them to continue studying in way that will mostly be self-directed or autonomous
C2	CT02 - Command in understanding and expression, both in oral and written forms, of a foreign language
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
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

Know and understand the fundamental characteristics of the digital image and its forms of representation.	AC23	BC1	CC2
Know, understand and know how to apply digital image processing techniques.	AC24	BC3	CC3
Know, understand and know how to apply digital image analysis techniques.	AC25	BC5	CC8
Ability to apply different techniques to computer vision problems.	AC26	BC6	
		BC7	
		BC10	

Contents	
Topic	Sub-topic
Introduction to computer vision.	
Programming environments and libraries for computer vision.	
Color spaces and preprocessing.	
Local operators.	
Fundamentals of image segmentation.	
Fundamentals of multiscale analysis.	

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A24 A25 A26 A27 B1 B3 B5 B6 B7 B10 C2 C3 C8	10	22	32
Laboratory practice	A24 A25 A26 A27 B1 B3 B5 B6 B7 B10 C2 C3 C8	7	21	28
Case study	A24 A25 A26 A27 B1 B3 B5 B6 B7 B10 C2 C3 C8	4	10	14
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
Guest lecture / keynote speech	The teacher presents a topic to the students with the aim of providing a set of information with a specific scope. This teaching methodology will be applied to the training activity "Theory classes".
Laboratory practice	The teaching staff of the subject poses to the students a problem or problems of a practical nature whose resolution requires the understanding and application of the theoretical-practical contents included in the contents of the subject. Students can work on the solution to the problems raised individually or in groups. This teaching methodology will be applied to the training activity "Practical laboratory classes" and may be applied to the training activity of "Problem-based learning sessions, seminars, case studies and projects".
Case study	Students are presented with a work scenario, real or fictitious, that presents a certain problem. Students must apply the theoretical-practical knowledge of the subject to find a solution to the question or questions raised. As a general rule, the case study will be carried out in groups. The different working groups will present and share their solutions.

Personalized attention	
Methodologies	Description
Guest lecture / keynote speech	The teaching staff will assist the students in individualized tutorial sessions dedicated to orientation in the study and the resolution of doubts about the contents and work of the subject.

Assessment			
Methodologies	Competencies	Description	Qualification
Guest lecture / keynote speech	A24 A25 A26 A27 B1 B3 B5 B6 B7 B10 C2 C3 C8	The part related to the presentation of the master sessions will be evaluated through written tests and/or through the continuous evaluation of laboratory practices, which will evaluate the adequacy of the proposed solutions to the problems, the quality of the results obtained and the understanding of the techniques used.	40
Case study	A24 A25 A26 A27 B1 B3 B5 B6 B7 B10 C2 C3 C8	Resolution of case studies. The adequacy of the proposed solutions to the problems, the quality of the results obtained and the understanding of the techniques used will be assessed.	60

Assessment comments
All assignment and test notes will be retained until the second chance. There the students will be able to repeat some of the assessment activities. The final grade will be the one calculated taking into account the maximum marks between the corresponding activities in both opportunities. A student will be classified as Absent if he / she does not present any assessment exercise or take any test at any of the opportunities.The total or partial copy of any exercise of practice or theory will suppose a fail in both occasions of the course, with a qualification of 0,0 in both cases.

Sources of information	
Basic	- Richard Szeliski (2010). Computer Vision: Algorithms and Applications. Springer Science.
Complementary	- Gonzalez & Woods (2009). Digital image processing. Pearson. - D.A. Forsyth y J. Ponce (2002). Computer Vision--A Modern Approach. Prentice Hall. - Steger, Carsten and Ulrich, Markus and Wiedemann, Christian (2018). Machine vision algorithms and applications. John Wiley.

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
Daily work is recommended for the study of theory, practical work and problem-solving. We also consider important to make use of mentoring for discussion of practical problems and as a means of immediate resolution of doubts.