Teaching Guide				
Identifying Data				2024/25
Subject (*)	Instrumentation and Processing for Biomedical Applications		Code	614535012
Study programme	Máster Universitario en Visión por Computador			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatory	6
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Computación e Tecnoloxías da Información			
Coordinador	Novo Bujan, Jorge	E-mail	j.novo@udc.es	
Lecturers	De Moura Ramos, Jose Joaquim Novo Bujan, Jorge	E-mail	joaquim.demoura@udc.es j.novo@udc.es	
Web	https://www.imcv.eu/guide/2024-2025/ipbma/			
General description				

Study programme competences / results	
Code	Study programme competences / results
A1	CE1 - To know and apply the concepts, methodologies and technologies of image processing
A3	CE3 - To know and apply the concepts, methodologies and technologies of image and video analysis
A7	CE7 - To understand and apply the fundamentals of medical image acquisition, processing and analysis
B2	CB7 - That students are able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study
B3	CB8 - That students are able to integrate knowledge and deal with the complexity of making judgements based on information that is incomplete or limited, including reflections on social and ethical responsibilities linked to the application of their knowledge and judgements
B5	CB10 - That students possess the learning skills to enable them to continue studying in a largely self-directed or autonomous manner
B8	CG3 - Ability to develop computer vision systems depending on existing needs and apply the most appropriate technological tools
B9	CG4 - Ability to critically analyze and rigorously evaluate technologies and methodology
B12	CG7 - Ability to learn autonomously for specialization in one or more fields of study
C4	CT4 - Ability to understand the meaning and application of the gender perspective in different areas of knowledge and professional practice with the aim of achieving a more just and equal society

Learning outcomes			
Learning outcomes	Study programme competences / results		
Understand the basic concepts related to different biomedical imaging modalities and the physical factors that influence their properties.	AC1 AC3 AC7	BC2 BC3 BC5 BC8 BC9 BC12	CC4
To know the statistical techniques currently used for the validation of biomedical applications.	AC1 AC3 AC7	BC2 BC3 BC5 BC8 BC9 BC12	CC4

Ability to apply different processing and analysis techniques in biomedical imaging applications.	AC1 AC3 AC7	BC2 BC3 BC5 BC8 BC9 BC12	CC4
Knowledge of image registration techniques and their applications in biomedical imaging.	AC1 AC3 AC7	BC2 BC3 BC5 BC8 BC9 BC12	CC4

Contents	
Topic	**Sub-topic**
Basic concepts of biomedical imaging.	
Biomedical imaging modalities.	
Validation techniques in biomedical applications.	
Biomedical image processing and analysis.	
Registration of biomedical images.	
Biomedical imaging applications.	

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Laboratory practice	B2 B3 B8 B12	15	51.84	66.84
Supervised projects	B2 B3 B8 B12	10	34.56	44.56
Guest lecture / keynote speech	A1 A3 A7 B5 B9 C4	14	21.6	35.6
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**
Laboratory practice	Practical exercises in computer classrooms, learning based on the resolution of practical cases, combining work and autonomous learning with group work for cooperative learning
Supervised projects	Presentations of project-oriented works
Guest lecture / keynote speech	Participatory Master Lessons

Personalized attention	
Methodologies	**Description**
Laboratory practice Supervised projects	Attention to the challenges posed to students both in the practices and in the work.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Laboratory practice	B2 B3 B8 B12	Development practices of applied cases	50
Guest lecture / keynote speech	A1 A3 A7 B5 B9 C4	Demonstration of application of knowledge taught in class	20

Supervised projects	B2 B3 B8 B12	Practical projects related to the subject	30

Assessment comments

Sources of information	
Basic	- Bushberg JT, Seibert JA, Leidholdt EM, Boone JM: ?The Essential Physics of Medical Imaging?. Lippincott Williams & Wilkins. 2002. - Fish P: ?Physics and Instrumentation of Diagnostic Medical Ultrasound?. John Wiley & Sons. 1999.- Sprawls Perry: "Magnetic Resonance Imaging. Principles, Methods and Techniques". Medical Physics Publishing. 2000. p { margin-bottom: 0.25cm; direction: ltr; line-height: 115%; text-align: left; orphans: 2; widows: 2; background: transparent }- Bushberg JT, Seibert JA, Leidholdt EM, Boone JM: ?The Essential Physics of Medical Imaging?. Lippincott Williams & Wilkins. 2002. - Fish P: ?Physics and Instrumentation of Diagnostic Medical Ultrasound?. John Wiley & Sons. 1999.- Sprawls Perry: "Magnetic Resonance Imaging. Principles, Methods and Techniques". Medical Physics Publishing. 2000. p { margin-bottom: 0.25cm; direction: ltr; line-height: 115%; text-align: left; orphans: 2; widows: 2; background: transparent }
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Fundamentals of Machine Learning for Computer Vision /614535007 Fundamentals of Image Processing and Analysis /614535001
Subjects that continue the syllabus
Biomedical Image Analysis/614535013
Other comments
- As reflected in the various regulations applicable to university teaching, the gender perspective should be incorporated into this subject (non-sexist language will be used, bibliography from authors of both sexes will be used, the intervention of male and female students in class will be encouraged...).- Work will be done to identify and modify sexist prejudices and attitudes, and we will influence the environment to change them and promote values of respect and equality.- Situations of discrimination on the grounds of gender should be detected and actions and measures should be proposed to correct them.