UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				**2016/17**
Subject (*)	Análise de imaxes biomédicas		**Code**	614522010
Study programme	Mestrado Universitario en Bioinformática para Ciencias da Saúde			
Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Official Master's Degree	2nd four-month period	First	Obligatoria	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Computación			
Coordinador	Gonzalez Penedo, Manuel		**E-mail**	manuel.gpenedo@udc.es
Lecturers	Barreira Rodriguez, Noelia		**E-mail**	noelia.barreira@udc.es
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Web				
General description	This course presents introductory medical image processing and analysis techniques. It presents basic concepts about image processing. Topics include data acquisition, imaging, filtering, image segmentantion and registration. The focus of the course is to provide a global perspective and practical experience in the field.			

Study programme competences / results	
Code	**Study programme competences / results**
A1	CE1 - Ability to know the scope of Bioinformatics and its most important aspects
A2	CE2 ? To define, evaluate and select the architecture and the most suitable software for solving a problem in the field of bioinformatics
A4	CE4 - Ability to acquire, obtain, formalize and represent human knowledge in a computable form for the resolution of problems through a computer system in any field of application, particularly those related to aspects of computing, perception and action in bioinformatics applications
A6	CE6 - Ability to identify software tools and most relevant bioinformatics data sources, and acquire skill in their use
B1	CB6 - Own and understand knowledge that can provide a base or opportunity to be original in the development and/or application of ideas, often in a context of research
B2	CB7 - Students should know how to apply the acquired knowledge and ability to problem solving in new environments or little known within broad (or multidisciplinary) contexts related to their field of study
B5	CB10 - Students should possess learning skills that allow them to continue studying in a way that will largely be self-directed or autonomous.
B6	CG1 -Search for and select the useful information needed to solve complex problems, driving fluently bibliographical sources for the field
B7	CG2 - Maintain and extend well-founded theoretical approaches to enable the introduction and exploitation of new and advanced technologies
C3	CT3 - Use the basic tools of the information technology and communications (ICT) necessary for the exercise of their profession and lifelong learning
C6	CT6 - To assess critically the knowledge, technology and information available to solve the problems they face to.

Learning outcomes			
Learning outcomes	**Study programme competences / results**		
Understand the medical imaging modalities and their significance	AJ1	BJ1	
Understand the basic concepts of image processing	AJ4 AJ6	BJ5 BJ6	CJ3
Design and evaluate medical analysis techniques	AJ2	BJ2 BJ7	CJ6

Contents	
Topic	**Sub-topic**
Introduction to digital imaging.	Adquisition models.
	Quality metrics.
	Color spaces.
	Histograms.
Image processing.	Enhancement.
	Edge detection.
	Segmentation.
	Morphological operators.
Image registration and fusion.	Intensity vs features.
	Similarity measures.
	Multimodal methods.
Validation of medical image analysis methodologies	Measures for quality assessment
	Training and testing methods
	Statistical tests

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A1 A4 B1	24	24	48
Laboratory practice	A2 A6 B2 B7 C3	16	40	56
Supervised projects	B5 B6	4	28	32
Oral presentation	C6	4	4	8
Objective test	A1 A2 B1 B2 C6	3	0	3
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	Lectures with the use of audiovisual aids. Questions will be raised in order to transmit the knowledge and enforce the learning.
Laboratory practice	The aim is to solve common problems in medical imaging using the methods explained in the lectures.
Supervised projects	Students in pairs will make a project about a relevant topic in medical imaging.
Oral presentation	Students will present their project in the classroom.
Objective test	Test with questions about the theoretical contents of the subject as well as practical problems.

Personalized attention	
Methodologies	**Description**
Laboratory practice Supervised projects	Teachers will answer the doubts during the laboratory practice and they will provide personal advising for the supervised projects.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Oral presentation	C6	Comprehension of the issue. Clarity in the presentation. Preparing of additional contents to complement the explanation.	10

Laboratory practice	A2 A6 B2 B7 C3	Suitability of the proposed solutions to the problems. Quality of the obtained results. Comprehension of the employed techniques.	40
Supervised projects	B5 B6	Clarity in the presentation of the issue. Organization of the contents. Bibliography revision. Teamwork.	30
Objective test	A1 A2 B1 B2 C6	Written test with theoretical questions and practical problems to be solved.	20

Assessment comments
In order to pass this subject, students have to get, at least, 5 points out of 10 in laboratory practice and supervised projects.ACADEMIC EXEMPTION For all those students with half time dedication and academic exemption specific considerations will be taken.

Sources of information	
Basic	- Rafael C. González, Richard E. Woods (2010). Digital image processing. Upper Saddle River (New Jersey) : Pearson-Prentice Hall, [2010] - Milan Sonka, Vaclav Hlavac, Roger Boyle (2014). Image processing, analysis and machine vision. Pacific Grove, California : Brooks/Cole Publishing Company,
Complementary	- David A. Forsyth, Jean Ponce (2012). Computer vision : a modern approach. Boston : Pearson - Richard Szeliski (2010). Computer Vision: Algorithms and Applications. Springer (draft online)

Recommendations
Subjects that it is recommended to have taken before
Introdución á programación/614522001
Subjects that are recommended to be taken simultaneously
Probabilidade. estatística e elementos de biomatemática/614522007
Fundamentos de intelixencia artificial/614522003
Subjects that continue the syllabus
Visualización médica avanzada/614522019
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.