



Teaching Guide				
Identifying Data				2020/21
Subject (*)	Neuroengineering and innovation in neuroscience	Code	614522016	
Study programme	Mestrado Universitario en Bioinformática para Ciencias da Saúde			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	Second	Optional	3
Language	SpanishGalician			
Teaching method	Hybrid			
Prerequisites				
Department	Ciencias da Computación e Tecnoloxías da InformaciónFisioterapia, Medicina e Ciencias Biomédicas			
Coordinador	Rouco Maseda, Jose	E-mail	jose.rouco@udc.es	
Lecturers	Cudeiro Mazaira, F.Javier Rivadulla Fernandez, Juan Casto Rouco Maseda, Jose	E-mail	javier.cudeiro@udc.es casto.rivadulla@udc.es jose.rouco@udc.es	
Web	moodle.udc.es			
General description	The student will know the latest advances in Brain-Computer-Interface (BCI) technology and what type of data are analyzed in this type of systems			
Contingency plan	<p>1. Modifications to the contents None.</p> <p>2. Methodologies *Teaching methodologies that are maintained All of them. *Teaching methodologies that are modified If necessary, all the used methodologies could be applied on a non-presential basis with the available tools (Moodle, Teams, etc.)</p> <p>3. Mechanisms for personalized attention to students Continuous attention in Teams, Moodle and email.</p> <p>4. Modifications in the evaluation Not necessary. *Evaluation observations: None.</p> <p>5. Modifications to the bibliography or webgraphy None.</p>			

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
A3	CE3 ? To analyze, design, develop, implement, verify and document efficient software solutions based on an adequate knowledge of the theories, models and techniques in the field of Bioinformatics
A7	CE7 - Ability to identify the applicability of the use of bioinformatics tools to clinical areas.



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
B3	CB8 - Students to be able to integrate knowledge and deal with the complexity of making judgements from information that could be incomplete or limited, including reflections on the social and ethical responsibilities linked to the application of their skills and judgements
B4	CB9 - Students should know how to communicate their findings, knowledge and latest reasons underpinning them to specialized and non-specialized audiences in a clear and unambiguous way
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
B8	CG3 - Be able to work in a team, especially of interdisciplinary nature
C1	CT1 - Express oneself correctly, both orally writing, in the official languages of the autonomous community
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.
C7	CT7 ? To maintain and establish strategies for scientific updating as a criterion for professional improvement.
C8	CT8 - Rating the importance that has the research, innovation and technological development in the socio-economic and cultural progress of society

Learning outcomes			
Learning outcomes	Study programme competences / results		
Coñecer as distintas técnicas de estimulación cerebral non invasiva e a súa aplicación Neurociencia e ser capaz de valorar críticamente as súas contribucións e limitacións	AJ1 AJ7	BJ1 BJ5 BJ8	CJ1
Comprender o funcionamento do cerebro baixo a orientación de buscar alternativas para a súa exploración e estimulación.	AJ3	BJ6 BJ7	
Entender o funcionamento das interfaces avanzadas Cerebro-Computador; Fundamentos, etapas, aplicacións.	AJ1 AJ2 AJ3 AJ7	BJ1 BJ2 BJ3 BJ4	CJ3 CJ7
Comprender estratexias de axuda aos sentidos e ao movemento mediante a estimulación cerebral utilizando solucións integradas de enxeñaría.	AJ1 AJ7	BJ2 BJ4	CJ6 CJ8
Caracterización de patróns e eventos asociados a cambios de estado no cerebro.	AJ2 AJ7		CJ1 CJ6 CJ7
Comprender e saber explotar solucións integradoras da enxeñaría no ámbito neurolóxico co fin de mellorar as actividades da vida diaria en colectivos dependentes	AJ3	BJ3 BJ4	CJ7

Contents	
Topic	Sub-topic
Tema 1. Unha ventá ao cerebro: Novas Tecnoloxías na exploración e estimulación cerebral.	.



Tema 2. Interfaces Home-Máquina (Brain-Computer). Procesos, caracterización, avaliación de variables, recoñecemento de patróns, aprendizaxe.	
Tema 3. Neuroenxeñería, prótese e interfaces home-máquina: axudando ao movemento e aos sentidos	
Tema 4. Análise para a detección de cambios de estado do cerebro: predicción de eventos.	

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Problem solving	A3 B1 B3 B5 B6 B8 C3 C6	8	16	24
Oral presentation	A1 B1 B4 B5 C1 C3 C6 C7 C8	2	10	12
Events academic / information	A1 A7 B3 B4	2	2	4
Objective test	A1 A3 B1 B2 B4 C1	2	16	18
Guest lecture / keynote speech	A1 A2 A3 A7 B1 B2 B7 C6	7	7	14
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
Problem solving	Técnica mediante a que se ten que resolver unha situación problemática concreta, a partir dos coñecementos que se traballaron, que pode ter máis dunha posible solución.
Oral presentation	Intervención inherente aos procesos de ensino-aprendizaxe baseada na exposición verbal a través da que o alumnado e profesorado interactúan dun modo ordenado, propoñendo cuestións, facendo aclaracións e expoñendo temas, traballos, conceptos, feitos ou principios de forma dinámica.
Events academic / information	Actividades realizadas polo alumnado que implican a asistencia e/ou participación en eventos científicos e/ou divulgativos (congresos, xornadas, simposios, cursos, seminarios, conferencias, exposicións, etc.) co obxectivo de profundar no coñecemento de temas de estudo relacionados coa materia. Estas actividades proporcionan ao alumnado coñecementos e experiencias actuais que incorporan as últimas novidades referentes a un determinado ámbito de estudo.
Objective test	Examen sobre os contidos da materia
Guest lecture / keynote speech	Exposición oral complementada co uso de medios audiovisuais e a introdución de algunhas preguntas dirixidas aos estudantes, coa finalidade de transmitir coñecementos e facilitar a aprendizaxe. A clase maxistral é tamén coñecida como ?conferencia?, ?método expositivo? ou ?lección maxistral?. Esta última modalidade sóse reservar a un tipo especial de lección impartida por un profesor en ocasións especiais, cun contido que supón unha elaboración orixinal e baseada no uso case exclusivo da palabra como vía de transmisión da información á audiencia

Personalized attention	
Methodologies	Description
Oral presentation	O estudante terá apoio a través de tutorías personalizadas durante o proceso de preparación da exposición

Assessment			
Methodologies	Competencies / Results	Description	Qualification



Oral presentation	A1 B1 B4 B5 C1 C3 C6 C7 C8	Grado de elaboración da proposta Claridade expositiva Capacidade de reflexión	20
Problem solving	A3 B1 B3 B5 B6 B8 C3 C6	Participación na aula Entrega de cuadernillo	30
Objective test	A1 A3 B1 B2 B4 C1	Avaliación dos coñecementos	50

Assessment comments

Sources of information

Basic	
Complementary	

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

(*)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.