UNIVERSIDADE DA CORUÑA

Teaching Guide			
Identifying Data			2023/24
Subject (*)	Biological and Computational Models of Knowledge Representation	Code	610490017
Study programme	Mestrado Universitario en Neurociencia (Plan 2011)		

Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3

Language	Spanish		
Teaching method	Face-to-face		
Prerequisites			
Department	Ciencias da Computación e Tecnoloxías da InformaciónComputación		
Coordinador	Pazos Sierra, Alejandro	E-mail	alejandro.pazos@udc.es
Lecturers	Pazos Sierra, Alejandro	E-mail	alejandro.pazos@udc.es
Web	www.usc.gal/es/estudios/masteres/ciencias-salud/master-universitario-neurociencia		
General description	To introduce students to some of the techniques of knowledge representation in Intelligent Systems. On the other hand, to see an example of distributed knowledge representation compatible and based on some biological system for the representation of knowledge.		

Study programme competences	
Code	Study programme competences

Learning outcomes			
Learning outcomes	Study programme competences		
To study the fundamental process of modeling an adaptive system			
To study the fundamental process of modeling an adaptive system			
To understand the characteristics of natural knowledge and its representation and to know the mode of reasoning of the adaptive systems and of the different methods for their learning			
To understand the characteristics of natural knowledge and its representation and to know the mode of reasoning of the adaptive systems and of the different methods for their learning			
Understand the neurobiological basis on which adaptive systems are based, from which they derive their structure and functionalities			
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To study the fundamental process of modeling an adaptive system			
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Contents	
Topic	Sub-topic
1. HISTORICAL AND BASIC CONCEPTS OF ADAPTATIVE SYSTEMS	1.1 Evolución histórica e precursores. 1.2 Nacemento.

2. MODELOS	2.1 Proceso de Modelización. 2.2 Comparación entre o elemento biolóxico e o formal.
3. O COÑECEMENTO NATURAL E A SÚA REPRESENTACIÓN.	3.1 Características do coñecemento do mundo real. 3.2 Formas de representación do coñecemento.
4. RAZOAMENTO E APRENDIZAXE.	4.1 Modos de Razoamento. 4.2 Tipos de Aprendizaxe.
5. METODOLOXÍA EN SISTEMAS ADAPTATIVOS	5.1 Introducción. 5.2 Etapas da Metodoloxía.
6. APLICACIONS BÁSICAS DOS SISTEMAS CONEXIONISTAS	6.1 Consideracións previas. 6.2 Aplicacións.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech		10	20	30
Collaborative learning		10	10	20
Supervised projects		5	20	25
Personalized attention		0		0
(*)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	Content of the subject
Collaborative learning	Comments on scientific articles and practical exercises
Supervised projects	Carrying out a paper on one of the themes of the subject

Personalized attention	
Methodologies	Description
Collaborative learning Supervised projects	Atencíon nas horas de tutoría para guiar a elaboración dos traballos en grupo.

Assessment			
Methodologies	Competencies	Description	Qualification
Collaborative learning		Debates and comments in class about the contents of theory	20
Guest lecture / keynote speech		Assessment by examination of short or development questions	50
Supervised projects		Works to increase knowledge about the contents of the subject	30

Assessment comments

Sources of information

Basic	Arbib M.A.: "Cerebros, Máquinas y Matemáticas". Ed. Alianza Universidad. Madrid. 1987.Arbib, M.A.: ?The handbook of brain theory and neural networks?. Cambridge, Massachusetts. MIT Press. 1995.Grossberg, S.: "Neural Networks and Natural Inteligence". Editor: MIT Press, 1988.Hertz, J., Krogh, A. & Palmer, R.: "Introduction to the Theory of Neural Computation". Santa Fe Institute, Addison-Wesley Editores 1991.Hinton, G.E.: ?How Neural Networks Learn from Experience?. Scientific American, 267, 144-151. 1992.McCulloch, W. S., and Pitts, W.: "A Logical Calculus of the Ideas Inmanent in the Neural Nets". Buletin of Mathematical Biophysics, vol. 5, pp. 115-137. 1943.McCulloch, W.S., Arbib, M.A. & Cowan, J.D. "Neurological Models and Integrative Processes". In Yacovits, Jacobi and Goldstein. Ed. Selft-Organizing Systems.Spartan bocks. Washington. 1969.Minsky, M. & Papert, S.: "Perceptrons". Cambridge, MIT Press. 1988. Ramón y Cajal, S.: "Textura del Sistema Nervioso del Hombre y los Vertebrados". tomo I. Ed. Alianza. 1989.Rosenblueth, A., Wiener, N, and Bigelow, J.: "Behavior, Purpose and Teleology". Phylosophy of Science nº10, pp. 18-24. 1943.Rumelhart, D.E., Widrow, B. & Lehr, M. A.: "The basic ideas in neural networks". Comm. ACM. Num 37. pp 87-92. 1994.
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.