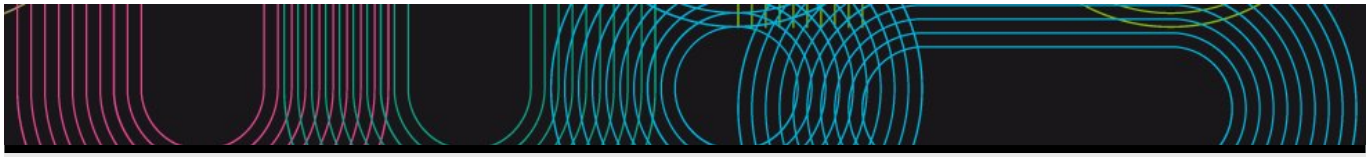
Universidade Vigo

Subject Guide 2022 / 2023



IDENTIFYING DATA				
(*)Biolectroquímica				
Subject	(*)Biolectroquímica			
Code	V04M192V01204			
Study programme	Máster Universitario en Ingeniería Biomédica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	2nd
Teaching language	Galician			
Department				
Coordinator	Nóvoa Rodríguez, Ramón			
Lecturers	Nóvoa Rodríguez, Ramón			
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General description	In this subject it is intended to introduce students to the discipline of Electrochemistry, its fundamentals and their applications, with special emphasis on biotechnological applications.			

Skills	
Code	
A5	Students must possess the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.
B3	Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C10	Knowledge and ability to apply the principles of the electrochemistry in the biomedical field.
D3	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.

Learning outcomes	
Expected results from this subject	Training and Learning Results
To know the principles of biolectrochemistry.	B3 C10
To apply knowledge of bioelectrochemistry in the field of biomedical engineering.	A5 B3 C10 D3

Contents	
Topic	
1. Introduction.	Nature and applications of electrochemistry. Electrolytes in living beings.
2. Electrochemical Cells.	Properties. Electrode Potential. Reference electrodes.
3. Interfaces.	Double layer models. Electrokinetic Phenomena
4. Kinetics and transport in electrode reactions	Butler-Volmer Equation. Fick's Laws
5. Experimental techniques.	Potentiometry. Amperometry. Voltammetry. Impedance. Electrophoresis.

6. Sensors (electrochemical and bioelectrochemical).	Potentiometric Sensors Amperometric Sensors Impedimetric Sensors Macroelectrodes Microelectrodes Miniaturization (lab-on-chip).
7. Biocompatibility and corrosion.	Corrosion basics Corrosion in sensors and implants

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	15	30	45
Laboratory practical	6	9	15
Problem solving	3	4.5	7.5
Report of practices, practicum and external practices	0.5	4	4.5
Essay questions exam	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

	Description
Lecturing	Presentation of the subject contents with audiovisual support.
Laboratory practical	The practices will have individual support to the students
Problem solving	The resolution of exercises will have individual support to the students

Personalized assistance

Methodologies	Description
Lecturing	Practical aspects with example exercises will be interspersed in the presentation of contents.
Laboratory practical	Exercises and practices will be carried out synchronized with theoretical teaching
Problem solving	The exercises, with individual support, will allow to fix the theoretical concepts.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	Classical exam of theory and exercises	60		B3	C10	
Laboratory practical	The development in the laboratory, the previous preparation of the practice and the final report are graded	20	A5			D3
Problem solving	Autonomous work and presented memory are graded	20	A5	B3	C10	D3

Other comments on the Evaluation

Sources of information

Basic Bibliography

R. Navanietha Krishnaraj, Rajesh K. Sani, **Bioelectrochemical Interface Engineering**, 978-1-119-53842-4, Wiley, 2019

C. M. A. BRETT, **ELECTROCHEMISTRY**, 0 19 855388 9, Oxford University Press, 1993

Complementary Bibliography

P. N. Bartlett, **Bioelectrochemistry**, 978-0-470-84364-2, Wiley, 2008

Recommendations