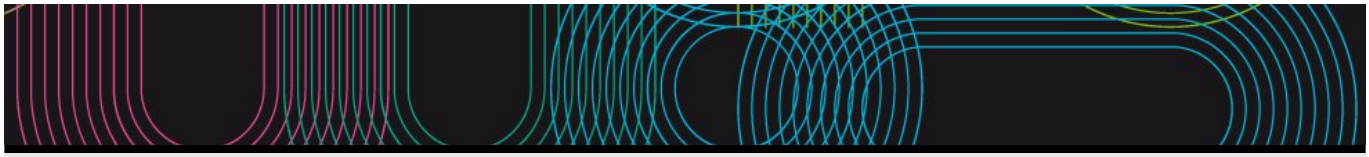

| IDENTIFYING DATA | | | | |
|---|---|---|---|---|
| **Bioelectrochemistry** | | | | |
| Subject | Bioelectrochemistry | | | |
| Code | V12G350V01921 | | | |
| Study programme | Degree in Industrial Chemical Engineering | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4th | 1st |
| Teaching language | Galician | | | |
| Department | | | | |
| Coordinator | Nóvoa Rodríguez, Ramón | | | |
| Lecturers | Nóvoa Rodríguez, Ramón | | | |
| E-mail | rnovoa@uvigo.gal | | | |
| Web | http://faitic.uvigo.es/ | | | |
| General description | (*)In this subject it is intended to introduce students to the discipline of electrochemistry, its fundamentals and applications, with particular emphasis on industrial and biotechnological applications. | | | |

| Competencies | |
|---|---|
| Code | |
| B3 | CG3 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. |
| B4 | CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering specializing in Industrial Chemistry. |
| C16 | CE16 Basic knowledge and application of environmental technologies and sustainability. |
| C19 | E19 Knowledge of mass and energy balances, biotechnology, mass transfer, separation operations, chemical reaction engineering, reactor design, and recovery and processing of raw materials and energy resources. |
| D2 | CT2 Problems resolution. |
| D9 | CT9 Apply knowledge. |
| D10 | CT10 Self learning and work. |
| D17 | CT17 Working as a team. |

| Learning outcomes | | | |
|---|---|---|---|
| Expected results from this subject | Training and Learning Results | | |
| Know the basic appearances of the electrochemical reactions applied to biotechnological systems. | B3<br>B4 | C19 | D2<br>D10<br>D17 |
| Apply the basic concepts of bioelectrochemistry to removing contaminants , bioenergy, bio-corrosion , etc. | B4 | C16 | D9<br>D17 |

| Contents | |
|---|---|
| Topic | |
| Electrolytes and interfaces | Electrode potential<br>Structure of interfaces<br>Electrochemical kinetics<br>Mass transport |
| Methods of study | Electrochemical instrumentation<br>Electrodes<br>DC methods<br>AC methods |
| Sensors | Potentiometric (including enzymatic selectivity).<br>Amperometric |

| | |
|---|---|
| Industrial electrochemistry | Electrolysis<br>Syntheses<br>Batteries<br>Fuel cells (including those bio-based) |
| Corrosion | Fundamentals<br>Protection methods |
| Biointerfaces | Interfaces between biomolecules<br>Bio-energy<br>Bio-catalysis |

**Planning**

| | Class hours | Hours outside the classroom | Total hours |
|---|---|---|---|
| Lecturing | 32.5 | 65 | 97.5 |
| Laboratory practical | 9 | 13.5 | 22.5 |
| Problem solving | 9 | 13.5 | 22.5 |
| Problem and/or exercise solving | 2 | 0 | 2 |
| Problem and/or exercise solving | 2 | 0 | 2 |
| Report of practices, practicum and external practices | 0.5 | 3 | 3.5 |

*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 with audiovisual support |
| Laboratory practical | Practical works synchronised with the master classes. Work on experimental techniques and practical cases. |
| Problem solving | Resolution of exercices enabling to fix the concepts of theory and confront the laboratory work with guarantee of success. |

**Personalized assistance**

| Methodologies | Description |
|---|---|
| Problem solving | The resolution of exercises and practices will have individualized assistance to students. |
| Laboratory practical | The resolution of exercises and practices will have individualized assistance to students. |

**Assessment**

| | Description | Qualification | Training and Learning Results | | |
|---|---|---|---|---|---|
| Laboratory practical | Work in the laboratory and report of activity | 20 | B4 | | D9<br>D17 |
| Problem solving | Examination with exercises related with the theory | 20 | B4 | C16<br>C19 | D2<br>D9<br>D10 |
| Problem and/or exercise solving | Evaluate the concepts presented in the lessons by means of an examination of short questions. | 60 | B3 | C16<br>C19 | D9<br>D10 |

**Other comments on the Evaluation**

Ethical commitment:

The student is expected to have an adequate ethical behaviour. In the case of unethical behavior (copying, plagiarism, unauthorized use of electronic devices, etc.) will be considered as not fulfilling the requirements to pass the subject. In which case the overall rating in the current academic year will be FAIL (0.0 points).

The use of unauthorised electronic devices is not allowed. Introducing unauthorised electronic devices in the examination room will be considered reason FAIL the subject in the current academic year and will hold overall rating of 0.0 points.

**Sources of information**

**Basic Bibliography**

C.M.A. Brett, A.M. Oliveira-Brett, **Electrochemistry : principles, methods and applications**, Oxford University Press,

A. J. Bard, **Electrochemical methods : fundamentals and applications**, J. Wiley,

**Complementary Bibliography**

## Recommendations

### Subjects that it is recommended to have taken before

Chemistry: Chemistry/V12G350V01205
Materials science and technology/V12G350V01305
Chemical engineering 1/V12G350V01405
Electronic technology/V12G350V01402
Chemical engineering 2/V12G350V01503

### Other comments

Requirements:
To enroll in this subject it is necessary to have passed all the subjects of the courses below or be enrolled in matters not overcome.

## Contingency plan

### Description

Laboratory practices and problem-solving (developed in seminars) will be weighted according to the degree of development. If there are fewer laboratory practices, the seminar part will have more weight. Between the two they represent 40% of the total mark.