



## IDENTIFYING DATA

### Biotechnological processes and products

|                     |  |           |      |            |
|---------------------|--|-----------|------|------------|
| Subject             | Biotechnological processes and products  |           |      |            |
| Code                | V02M074V11113  |           |      |            |
| Study programme     | Máster Universitario en Biotecnología Avanzada   |           |      |            |
| Descriptors         | ECTS Credits   | Choose    | Year | Quadmester |
|                     | 3  | Mandatory | 1st  | 1st        |
| Teaching language   | Spanish  |           |      |            |
| Department          |  |           |      |            |
| Coordinator         | Longo González, María Asunción   |           |      |            |
| Lecturers           | Álvarez Álvarez, María Salomé<br>Deive Herva, Francisco Javier<br>Longo González, María Asunción<br>Rosales Villanueva, Emilio<br>Veiga Barbazán, M <sup>a</sup> del Carmen  |           |      |            |
| E-mail              | mlongo@uvigo.es  |           |      |            |
| Web                 | <a href="http://http://masterbiotecnologiaavanzada.com/index.php/plan-docente/materias">http://http://masterbiotecnologiaavanzada.com/index.php/plan-docente/materias</a>  |           |      |            |
| General description | Basic concepts of analysis and design of biotechnological processes, with special emphasis on process integration and good manufacturing practices. Introduction to optimization, modeling and simulation of biotechnological processes. |           |      |            |

## Training and Learning Results

|      |   |
|------|---|
| Code |   |
| A4   | Communicate findings and the ultimate knowledge and rationale underpinning them to specialist and non-specialist audiences in a clear and unambiguous way                           |
| A5   | Acquire the learning skills that will enable them to continue studying in a largely self-directed or autonomous way.  |
| C9   | Design and carried out a complete purification protocol for a molecule, organelle or cell fraction  |
| C10  | Design, plan, evaluate and optimize biotechnological production systems   |
| C11  | Design and manage biotechnology-based projects  |
| D1   | Understand the meaning and application of the gender perspective in the different fields of knowledge and in practice with the aim of achieving a more just and egalitarian society |
| D2   | Oral and writing communication in the Galician language   |
| D3   | Sustainability and environmental commitment. Commit to sustainability and the environment. Fair use, responsible and resource efficient   |

## Expected results from this subject

| Expected results from this subject   | Training and Learning Results |
|--|-------------------------------|
| Know how to design, plan, optimize and evaluate biotechnological production systems                              | C10                           |
| Know how to design and execute a complete protocol for the purification of products of biotechnological interest | C9                            |
| Analyze and design biotechnological processes and associated operations  | C11                           |
| Identify and extract from the specialized literature the necessary information for the resolution of problems    | A5<br>D1<br>D3                |
| Understand and practice the dynamics of teamwork and develop managerial and organizational skills                | D2                            |
| Prepare technical action protocols of biotechnological interest  | C10<br>C11                    |
| Plan and design strategies in Biotechnology companies within the context of sustainability                       | C10<br>D3                     |

Use an adequate logical structure and an appropriate language for the non-specialist public and defend it A4 before experts in the subject

## Contents

### Topic

|   |   |
|---|---|
| 1. Analysis of biotechnological processes                 | Interpretation and elaboration of flowsheets  |
| 2. Design of biotechnological processes: general concepts | Conceptual process design, basics of hierarchical design  |
| 3. Process integration                                    | Raw material preparation, reaction, separation, purification  |
| 5. Good manufacturing practices (GMP)                     | Quality standards in biotechnological processes   |
| 6. Modeling and simulation of biotechnological processes  | Description of transport phenomena and biotransformations. Introduction to dynamic simulation. Modeling and simulation of bioprocesses in homogeneous systems. Modeling and simulation of bioprocesses in systems with spatial distribution |

## Planning

|   | Class hours | Hours outside the classroom | Total hours |
|---|-------------|-----------------------------|-------------|
| Lecturing   | 10          | 20                          | 30          |
| Case studies  | 4.5         | 9.5                         | 14          |
| Practices through ICT                                 | 8           | 16                          | 24          |
| Objective questions exam                              | 1           | 0                           | 1           |
| Report of practices, practicum and external practices | 0           | 5                           | 5           |
| Self-assessment                                       | 1           | 0                           | 1           |

\*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 by the teacher of the contents on the subject, theoretical bases and / or guidelines of a work, exercise or project to be developed by the student.   |
| Case studies          | Analysis of a fact, problem or real event with the purpose of understanding it, interpreting it, solving it, generate hypotheses, contrast data, reflect, complete knowledge, diagnose it and design alternative settlement procedures |
| Practices through ICT | Activities to apply knowledge to specific situations and to acquire basic and procedural skills related to the subject matter of study, which are carried out in computer equipped classrooms.   |

## Personalized assistance

| Methodologies         | Description   |
|-----------------------|---|
| Lecturing             | The lecturer will address the questions raised by the students, mainly during the face-to-face sessions                 |
| Practices through ICT | The student will be advised, if necessary, to carry out computer practices, mainly during the face-to-face sessions     |
| Case studies          | The student will be advised, if necessary, for the analysis of practical cases, mainly during the face-to-face sessions |

## Assessment

|                       | Description   | Qualification | Training and Learning Results |                              |
|-----------------------|---|---------------|-------------------------------|------------------------------|
| Lecturing             | Final exam of objective questions, on the theoretical and practical contents of the course. | 40            | C9<br>C10<br>C11              |                              |
| Case studies          | Monitoring student work   | 20            | A4<br>A5                      | D1<br>D2<br>D3               |
| Practices through ICT | Practices reports   | 30            | A4<br>A5                      | C10<br>C11<br>D1<br>D2<br>D3 |
| Self-assessment       | Test-type questionnaire through the teaching platform.                                      | 10            | C9<br>C10<br>C11              |                              |

## Other comments on the Evaluation

Like the rest of the Master courses, continuous evaluation will be carried out during the weeks assigned to face-to-face teaching.

Final exams will be held on the dates provided in the academic calendar of the master.

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### Sources of information

#### Basic Bibliography

Robin Smith, **Chemical process design and integration**, 2ª, John Wiley & Sons, 2016

Henry C. Vogel and Celeste L. Todaro, **Fermentation and biochemical engineering handbook : principles, process design and equipment**, 3ª, Elsevier, 2014

#### Complementary Bibliography

Warren D. Seider, J. D. Seader, Daniel R. Lewin, Soemantri Widagdo, **Product and process design principles: synthesis, analysis, and evaluation**, 3ª, John Wiley & Sons, 2010

L.T. Biegler, I.E. Grossmann, and A.W. Westerberg, **Systematic methods of chemical process design**, 1ª, Prentice Hall, 1997

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### Recommendations

#### Other comments

It is advisable that students have English skills at the level of comprehension of texts, since most of the sources of information they will consult are published in English.