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Faculty of Experimental Science

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Subject Data

Name:	
BIOQUIMICA DE LOS PROCESOS INDUSTRIALES	
English name:	
BIOCHEMISTRY OF THE INDUSTRIAL PROCESSES	
Code:	**Type:**
757509 306	Optative

Hours:	**Total**	**In class**	**Out class**
Time distribution	**75**	**30**	**45**

ECTS:

Standard group	**Small groups**			
	Classroom	**Lab**	**Practices**	**Computer classroom**
2.5	**0**	**0**	**0.5**	**0**

Departments:	**Knowledge areas:**
Chemistry "Prfo JC Vilchez Martín"	Biochemistry and Molecular Biology
Year:	**Semester**
4th	First

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TEACHING STAFF		
Name:	**E-mail:**	**Telephone**
Rosa María León Banares	rleon@uhu.es	959219951
Others Data (Tutoring, schedule...)		
Office EX P4-N5-13 Email: rleon@uhu.es Office hours: Tuesday and Thursday de 12:00 a 14:00 h. Wednesday: 15:00 a 17:00 h		

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SPECIFIC INFORMATION OF THE COURSE

1. Contents description:

1.1 In English:

The course “Biochemical of the Industrial processes” offers to the student of the degree in Chemistry a global view of the applications of the Biochemistry and the Biotechnology, focused mainly in the agrifood and pharmateutical industries. Some techniques, such as PCR or DNA chips, are routinely used in clinical and agrifood analysis. Furthermore, many industries of the chemical, pharmaceutical and food/feed sectors use enzymes or microorganisms in their productive processes. A graduate in Chemistry should know the basis of these techniques.

1.2 In Spanish:

La asignatura de BIOQUÍMICA DE LOS PROCESOS INDUSTRIALES pretende ofrecer al graduado en Químicas una visión de las aplicaciones industriales de la Bioquímica y la Biotecnología, centrándose principalmente en la industria agroalimentaria y farmacéutica y en las aplicaciones medioambientales.

2. Background:

2.1 Situation within the Degree:

This is an optional subject in the last year for students who have already taken Biomolecules and Biochemistry and Molecular Biology. Some biotechnological techniques such as PCR are already routine in clinical and agri-food analyses, and since the coronavirus health crisis they are constantly in the media, any science graduate should know them in order to form your own opinion.

In addition, many industries in the chemical, food and pharmaceutical sectors use enzymes or microorganisms in their production processes. Any graduate in Chemistry must know the foundation of these techniques that will allow you to broaden your professional profile towards this kind of industries.

2.2 Recommendations

It is recommended to have taken and passed the subjects of Biomolecules and Biochemistry and Biology Molecular, taught in previous courses, although it is not a mandatory requirement

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3. Objectives (as result of teaching):

The main objectives of this subject are:

- Acquire an overview of biotechnology and biochemistry and their applications in different industrial sectors
- Understand the fundamentals of applying enzymes and microorganisms to processes industrial.
- Develop the ability to correctly apply the techniques studied in different situations in this and other disciplines
- Know the many practical applications of biotechnology in our society and in our environment

4. Skills to be acquired

4.1 Specific Skills:

C15: Know the structure and reactivity of the main classes of biomolecules and the chemistry of the main biological processes.
Q5: Interpretation of data from observations and measurements in the laboratory in terms of its significance and the theories that support it.
P6: Ability to carry out risk assessments related to the use of chemical substances and laboratory procedures.
Q1: Ability to demonstrate knowledge and understanding of the essential facts, concepts, principles and theories related to chemistry.
Q3: Competence to evaluate, interpret and synthesize data and chemical information.
Q4: Ability to recognize and carry out good practices in scientific work and professional.
Q6: Skill in handling and computer processing of data and chemical information.

4.2 General, Basic or Transversal Skills:

CB2: That students know how to apply their knowledge to their work or vocation in a way professional and possess the competencies that are usually demonstrated through the preparation and defense of arguments and problem solving within their area of study.
CB3: That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant issues of a social, scientific or ethical nature.
CB4: That students can transmit information, ideas, problems and solutions to a both specialized and non-specialized public.
CB5: That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

5. Training Activities and Teaching Methods

5.1 Training Activities:

- Practical theoretical group.
- Directed Activities Group.
- Tutored Work Group.
- Individual work.

5.2 Teaching Methods::

-On-site classes related to the theoretical and practical contents (problems) of the subject, using didactic resources such as slides, computerized presentations and videos.
- Seminars and conferences on specific topics of the contents of the subject, presentation of video and multimedia material to illustrate topics of the theoretical program.
- Visits to centers, institutions, companies in the chemical sector or similar.
- Tutored field practices.
- Tutored seminars on problem solving and practical cases.
- Realization of presentations by the students of aspects related to the agenda of the subject.
- Test and resolution of theoretical-practical questions.
- Discussion of scientific articles.
- Resolution of doubts.
- Self-evaluation exercises on the contents of the subject.
- Use of Web pages to support the teaching of the subject.

5.3 Development and Justification:

The teaching methodology used in this optional subject is based on face-to-face classes participatory sessions in which the main contents of the subject will be developed. These classes are complemented by the teaching of tutored seminars on specific topics, classes of resolution of doubts, discussion of scientific articles and other cross-curricular activities to strengthen knowledge and stimulate the critical spirit and skills of students. It will be especially relevant to make presentations by the students, who It will also allow them to acquire skills for writing and presenting content, aspect transversal that will serve them in many professional aspects. In addition, there will be activities that facilitate continuous evaluation and stimulate the study of the students as the course progresses, such as tests, theoretical-practical questions and self-assessment exercises. Another aspect veryAn important part of the teaching methodology in this subject are the field practices. will be performed visits to companies in the area of biotechnology in the area, in which the students will see first-hand hand the application of the teachings he has received

6. Detailed Contents

I. Introduction
II. Enzymatic Biotechnology
III. Microbial Biotechnology
IV. Techniques of Genetic manipulation
V. Industrial applications of Biochemistry and Molecular Biology

BLOCK I. INTRODUCTION

LESSON 1. INTRODUCCTION TO BIOTECHNOLOGY. Concept, historical view, formal objectives of biotechnology. Main applications, future perspectives, main industrial fields of application.

BLOCK II. BIOTECNOLOGÍA ENZIMÁTICA

LESSON 2. ENZYMATIC BIOTECHNOLOGY. Enzymatic source selection, general view of the enzymatic purification process, industrial enzymes (amylases, proteases, lipases, peptinases). Aplications of enzymes in research, biomedicine and biosensors. Biocatalysis immobilization.

BLOCK III. MICROBIAL BIOTECHNOLOGY

LESSON 3. MANTENANCE AND CULTURE OF MICROORGANISMS. Definition of microbial growth, Experimental methods for microbial growth determination, Disontinous growth, growth curve, exponential phase. Matematical expression of the microbial growth. Physiological factors affecting the specific growth rate.

LESSON 4. CONTINOUS GROWTH OF MICROORGANISMOS. Continous reactors. Quimiostats, intrisecal regulation of a quimiostat, Turbidostat. Cinetical models of the microbial growth. Equations of balance in a quimiostat. Kinds of reactors. Lab, pilot and industrial scale.

BLOCK III. GENETIC ENGINEERING AND MOLECULAR BIOLOGY

LESSON 5. TRANSGENIC BACTERIA APPLICATIONS. Genetic engineering. Clonning strategies. Isolation of foreingn DNA. Clonning vectors. Industrial examples of application of genetic engineering (insuline, recombinant vaccines), diagnostic techniques.

LESSON 6. TRANSGENIC PLANTS. Plant kingdon as a source of products. Traditional genetic engineering. Molecular genetic engineering. Methods for the genetic manipulation of plant cells. Examples: golden rice, Bt cotton.

BLOCK IV. INDUSTRIAL APPLICATION OF BIOTECHNOLOGY

LESSON 7. INDUSTRIAL APPLICATIONS OF BIOTECHNOLOGY. Biomass, Bioethatnol, biodiesel and other biofuels, Obtaining primary and secondary metabolites, antibiotics. Traditional biotechnology , Fermentative processes in food. Wine and vinification. Production of beer. Vinager. Vegetal fermentations.

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7. Bibliography

7.1 Basic Bibliography:

1. **Biotecnología Básica** J. Bu`lok and B. Kristiansen. Ed. Acribia, Zaragoza, 1987
2. **Basic Biotechnology.**
3. **Biotechnology from A to Z. 2ºEd.** William Bains Oxford University Press, London, 2000
4. **Environmental Micorbiology** R.M. Maier, I.L. Pepper, C.P. Gerba Academic Press,2000

4.2 Additional Bibliography:

5. www.wiley-vch.de/books/biotech
6. www.uah.es/otrosweb/biomodel
7. http://www.sebiot.org/

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8. Systems and Assessment Criteria

8.1 System for Assessment:

The evaluation of the course will be based on: a final exam, the preparation and exhibition of an individual talk, assistance to field practical lessons and a series of continuous activities carried out along the course.

8.2 Assessment Criteria and Marks:

8.2.1 Examinations Convocatory I

The evaluation of the course will be based on: a final exam (40% of the total mark), the preparation and exhibition of an individual talk (30%), a visit to a biotechnological company (10%) and a series of continuous activities carried out along the course (20%). The exam will consist of theoretical and practical questions. The minimum mark in the final exam will be 4. If the mark of this exam is higher than 4, the final mark will be the weighted average of all marks.

8.2.2 Examinations Convocatory II

Students with a continuous assessment system who have not passed the minimum required grade to do weighting of notes in the exam of the ordinary call I (4.0) may repeat this test. The final grade for the subject will be the weighted average of this exam with the other activities carried out throughout the course, with the same criteria as in call I -continuous assessment. Exam (40%) + AADD (20%) + work (30%) + field practices (10%), with a minimum mark in the exam of 4. In no case is the possibility of recovering AADD or field practices, which by their very nature will have to be carried out on a date scheduled

8.2.3 Examinations Convocatory III

As in the second call

8.2.4 Extraordinary Convocatory
As in the second call