

Academic Year/course: 2022/23

27149 - Microbial Biotechnology

Syllabus Information

Academic Year: 2022/23

Subject: 27149 - Microbial Biotechnology

Faculty / School: 100 - Facultad de Ciencias

Degree: 446 - Degree in Biotechnology

ECTS: 7.0

Year: 4

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, practice sessions and tutorials:

- 1- Lectures: Acquisition of basic concepts of this subject (4 ECTS)
- 2- Practice sessions: Laboratory work (2 ECTS)
- 3- Tutorials: Tutorized projects (1 ECTS)

4.2. Learning tasks

The teaching and evaluation activities will be carried out in-person unless, due to the health crisis situation, the depositions issued by the competent authorities and by the University of Zaragoza dispose to carry these activities out by telematic, or semi-telematic ways with limited capacity.

The course includes the following learning tasks:

Lectures: Acquisition of basic concepts of this subject (4 ECTS). Methodology: participative lectures which will be accomplished by the use of supporting material available in the ADD web.

Practice sessions: Laboratory work (2 ECTS). Methodology: problems and practical cases in the laboratory. This activity will be evaluated in individual and team work.

Tutorials: Tutorized projects (1 ECTS). Methodology: Design of biotechnological processes involving microorganisms. This work will be accomplished by examining the scientific literature and the basic concepts of the subject and it will be performed in groups of 6-8 students (small group). Presentation of the project and the subsequent scientific discussion will be carried out with the whole student group.

4.3. Syllabus

The course will address the following topics:

Topic 1. Introduction to microbial biotechnology. Microbial diversity. Taxonomy. Culture type collections

Topic 2. Applications of microbial biotechnology: human therapeutics, agriculture, food science and technology, environmental applications, daily life

Topic 3. Genetic manipulations of microorganisms. Synthetic Biology, Omic disciplines

Topic 4. Protein expression and purification in bacteria and fungi. Biocatalysis

Topic 5. Microbial biopolymers (polysaccharides and polyesters)

Topic 6. Food fermentations (wine, beer, dairy products)

Topic 7. Primary metabolites (organic acids, vitamins and aminoacids)

Topic 8. Secondary metabolites. Antibiotics (detection, genetic improvements, scaling, purification) and hormones

Topic 9. Phage Therapy

Topic 10. Microbiota concept and applications. Fecal microbiota transplants and probiotics

Topic 11. Vaccines: subunits, live attenuated, inactivated. Vaccination in different scenarios. New strategies (mRNA, DNA, viral vectored)

Topic 12. Applications in diagnostics and fight against bioterrorism

Topic 13. Biofuels and ethanol production

Topic 14. Agriculture. Biomass (interactions plant-microorganism, mycorrhizae, bioremediation, *Bacillus thuringiensis*). Biodegradation. Wastewater treatment

4.4. Course planning and calendar

Lectures will take place during the second half of the academic course. Schedules can be downloaded from:

<https://ciencias.unizar.es/grado-en-biotecnologia>

These lectures will be imparted according to the Academic Schedule approved by the University of Zaragoza.

Problems and Seminars will take place during the aforementioned schedule for the Lectures. The deadline to submit works performed by the students will be notified through the ADD web.

Concerning laboratory sessions and groups, this information will be notified in the classroom and through the ADD web.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27149>