Universidad Zaragoza

Academic Year/course: 2023/24

28920 - Biotechnology

Syllabus Information

Academic year: 2023/24
Subject: 28920 - Biotechnology
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 583 - Degree in Rural and Agri-Food Engineering
ECTS: 6.0
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The objectives of the subject are:

students will understand the fundamentals of biotechnology and be familiar with techniques that will be applied in agri-food processes.

On the other hand, they must be able to carry out basic activities of a biotechnology laboratory, whether plant or animal, following the most frequent protocols and handling the corresponding instruments.

The general contents of the subject are in line with the following sustainable development objectives:

Goal 2. To end hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Biotechnological tools that contribute to the improvement of production processes in the agricultural sector are explained training is relevant to goals 2.3, 2.4 and 2.5.

Goal 12. Ensure sustainable consumption and production patterns: targets 12.2, 12.3 and 12.4.

2. Learning results

Explain the fundamentals of the most relevant biotechnological applications in agronomy, both in the field of plant production and livestock production.

Describe the basic techniques of molecular biology and know how to apply some of them.

Understand and explain the techniques of in vitro culture and genetic engineering of plants.

Apply in vitro plant culture techniques.

Understand, describe and contrast the different biotechnologies used in animal health, reproduction and genetic improvement.

Apply reproductive biotechnologies in laboratory and field for the development of animal breeding programs.

3. Syllabus

Theory program

1.- Introduction and general context.

2.- Fundamentals of biotechnological advances: biochemistry and molecular biology.

3.- Molecular genetic tools and techniques (I).

4.- Molecular genetic tools and techniques (II).

5.- Genomic tools.

6.- Proteins and proteomics.

7.- In vitro culture of plant tissues and organs.

8.- Applications of plant micropropagation.

9.- Plant genetic engineering.

10.- Biotechnology of animal reproduction I. Oestrus detection and synchronization.

11.- Biotechnology of animal reproduction II. Artificial insemination.

12.- Biotechnology of animal reproduction III. Embryonic technologies.

13.- Biotechnology applications in animal breeding. Animal genetic engineering.

14.- Biotechnological applications in animal feed.

15.- Biotechnological applications in animal health.

Practical program:

1.- The protocol in the plant biotechnology laboratory.

2.- Isolation of DNA from plants.

3.- In vitro DNA synthesis: the polymerase chain reaction.

4.- DNA electrophoresis.

5.- Bioinformatics: databases and primer design.

6.- Bioinformatics: analysis of microsatellite markers.

7.- In vitro plant culture (I).

8.- In vitro plant culture (II).

9.- The protocol in the animal biotechnology laboratory.

10.- Spermiogram (I). Classical evaluation.

11.- Spermiogram (II). Advanced evaluation.

12.- Oocyte procurement and in vitro embryo culture.

13.- Sex determination and literature review.

14.- HUMECO Day.

4. Academic activities

Participative lectures. 30 face-to-face hours, 2-hour sessions dedicated to a topic of the theoretical program.

2.- Laboratory/cabinet internships, 30 classroom hours, 15 sessions of 2 hours duration to carry out a practical experience in correspondence with the theoretical program.

3.- Study for the written test, a total of 84 hours of autonomous work by the student. The teachers provide notes on the theoretical lectures and the slides used in the lectures. It also suggests basic bibliography and *online* self-learning tools.

4.- Tutoring sessions to monitor the learning process.

5.- Passing the written tests and the practical test: 6 classroom hours.

5. Assessment system

Written test at the end of the first theoretical block (6 topics), consisting of 6 open questions that will include theoretical aspects and will be graded each on 0.5 points. Passing this exam will require obtaining at least 2 points at . Students who pass this test may choose to take the exam at the end of the course only on the contents of the remaining 9 subjects.

Written test at the end of the course, in first and second call, on contents exposed in theoretical and practical classes. This test will consist of 10 open questions, each of which will be graded out of 1 point.

Students who have passed the partial test (1) may eliminate 3 questions from their exam. To overcome this the test will require at least 5 points, or 3.5 points in the case of students who passed the first exam. The grade obtained in this test or by adding the grades of the two written tests will account for 75% of the overall grade of the subject.

Practical laboratory or cabinet exam, on the same dates as the official exams, on the program of practices and graded out of 10 points. A minimum of 5 points is required to pass this test. The grade of this exam will represent 25% of the overall grade of the subject.

The theory (1+2 or 2) and practical (3) evaluation tests will be assessed on a total score of 10 and will then be applied as a percentage. If the minimum requirements are not reached in the evaluation activities of the subject (5 points for each test) it will not be considered approved even if the final grade averaged CF, is equal or higher than 5. In this case, the final grade that will be reflected in the course transcripts will be:

- If final grade averaged, CF ≥ 4, Fail, 4.
- If final grade averaged, CF < 4, Fail, CF.

In case of passing only one of the tests, the grade of that part will be retained only during the following exam of the same academic year.

The success rates for the subject in the last three years are: 2019/20: 62,50%; 2020/21: 78,95%; 2021/22: 52,94%