



**Universidad
de Burgos**

MSc Program: Advancements in Food Sciences and Biotechnologies

MSc in Food Safety and Biotechnology

Department of Biotechnology and Food Science

Faculty of Sciences

University of Burgos

COURSE						CODE
TITLE Genetic modification of food						7451
Tuition Period (semester)	Duration (in months)	Type (Mand/Op)	ECTS Credits	Hours (theoretical)	Hours (practical)	Hours (other activities)
Semester 1	1	Op	4	15	19	2

LECTURER IN CHARGE OF COURSE (1)			
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LECTURER (2)			
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3.3.1. SPECIFIC EDUCATIONAL OBJECTIVES
OBJECTIVES:
<ol style="list-style-type: none">1. The student should acquire theoretical and practical knowledge about the modern techniques used for gene isolation, manipulation and introduction into cells different from the starting ones, in such a way that the recombinant DNA may be able to replicate, express and transmit to the progeny.2. It is intended to motivate the student on the impact of rDNA technology in the food industry and in the society, by means of a detailed study of the actual applications in this sector.3. Laboratory practices should be done for genomic DNA extraction and isolation, quantitation and evaluation of the quality of the extracted DNA, use of PCR and qPCR for detection of samples obtained from genetically modified food.

COURSE PROGRAMME SUMMARY:**THEORETICAL:**

UNIT I. INTRODUCTION.

Topic 1: Presentation.

1.1. Objectives. 1.2. Course programme. 1.3. Laboratory practices. 1.4. Chronogram. 1.5. Classroom sessions. 1.6. Evaluation. 1.7. Scientific reports.

Topic 2. Introduction.

2.1. Introduction. 2.2. Concept of genetically modified food (GM foods). 2.3. Genetic engineering and GM foods.

UNIT II. GENETIC ENGINEERING APPLIED TO THE FOOD INDUSTRY SECTOR.

Topic 3. Techniques for the production of GM foods.

3.1. Generic techniques of genetic manipulation of microorganisms, plants and animals. Genome editing. 3.2. Steps towards genetic modification of food. 3.3 Genetic modification of plants. 3.4. Genetic modification of animals.

Topic 4. Application of genetic engineering in the food industry.

4.1. World surface cultivated with transgenic crops. 4.2. Types of GM foods.

UNIT III. SAFETY AND PUBLIC PERCEPTION OF THE GM FOODS.

Topic 5. Safety of the GM foods.

5.1 The precautionary principle and the principle of familiarity and substantial equivalence. 5.2. Safety from a sanitary perspective. 5.3. Environmental risks. 5.4. Economic risks.

Topic 6. Public and social perception of the GM foods.

6.1. Legislation regulating production and commercialization of the GM foods. 6.2. Social and ethical repercussion of the GM foods research, production and use.

PRACTICAL OR EXPERIMENTAL:

UNIT IV. LABORATORY PRACTICES.

Topic 7. Laboratory practices.

Extraction and isolation of genomic DNA from corn seeds and leaves. Quantitation and analysis of DNA integrity. Detection of GM foods by means of conventional PCR and qPCR. Bioinformatics.

3.3.2. TEACHING METHOD:**Learning Activities**

- Discussions-lectures

Face-to-face sessions will be followed in which the lecturer will lead group discussions by means of topic presentations with slides and colloquium trying to maximize the student's participation. Demonstrative videos will be used as well as laboratory practices.

All the materials (audio-visual) such as Power Point presentations, dynamic images, exercises, laboratory procedures, etc. used in the face-to-face sessions will be available in advance for the students via the platform UBVirtual. At the same time, in the fore mentioned platform, there will be complementary documentation available related to scientific recommended reading related to the subject.

The platform UBUVirtual will be used for on-line teaching, with an open forum that can be used for collective tutoring. The evaluation criteria for all the activities included in the teaching guide will also be visible. Another forum will be open for students to share diverse comments or materials such as pdf documents, videos, web links, etc. related to the subject. The on-line questionnaire will be available for the evaluation of the assessment test via UBUVirtual.

- Seminars and laboratory practices

On the other hand, the students will have to prepare a critical work related to a scientific topic included in the programme of the subject incorporating objectives, methodology, results and discussion sections, and will have to present it to the rest of the classroom in a seminar session. There will be another seminar session in which the students will have to present and explain the fundamentals and main results achieved in the laboratory practices.

ECTS credit allocations (Approximate Student workload in hours):

		Hours
Classroom	Lectures / Directed discussions	11
	Practical Classes (and laboratory notebook compilation)	12
	Seminars:	7
	Tutorials	1
	Essays - Presentations	4
	Assessment Tests	1
On Site - Total Hours:		36
Off campus	Workload to prepare theoretical classes	20
	Workload to prepare practical sessions and/or practical cases	20
	Presentation of the laboratory results in a seminar	5
	Workload to prepare the Essay - presentation	10
	Workload to prepare exams and/or evaluation tests	9
Off-Campus - Total Hours:		65
WORKLOAD - TOTAL HOURS:		100

3.3.3. ASSESSMENT CRITERIA AND METHOD

Continuous assessment will be the evaluation method, trying to follow with objectivity the individual ability of each student to develop their intellectual capacities of understanding, reflection, analysis and critical judgment on the topics discussed. Likewise, their attitude in solving problems and practical cases will be objectively assessed along with their psychomotor skills in the laboratory practices.

In any case, in order to succeed, it will be necessary to reach at least 50% of the maximum punctuation established for each assessment procedure.

According to the Regulation of Evaluation of the UBU, it will not be possible to assess for the second evaluation call the procedure "laboratory practices", because due to the characteristics of the activity it is not possible to repeat this procedure in the available timeframe designated to the subject.

The procedures susceptible to evaluation are the following, with their weight in the final grade indicated as a percentage.

Assessment procedure	Weight % in first call	Weight % in second call
Seminars and participation in face-to-face theoretical sessions	10 %	10 %
Laboratory practices and presentation of the lab results	25 %	25 %
Elaboration of a poster (essay on a topic related to the subject), similar to a Congress poster	20 %	20 %
On-line questionnaire	25 %	25 %
Presentation and discussion based on the poster (essay on a topic related to the subject)	20 %	20 %

3.3.4. LEARNING RESOURCES

Human resources: The lecturers of the Area of Biochemistry and Molecular Biology, and the support of the Technician of the Area for the preparation of material for the laboratory practices.

Material resources: General equipment of the area of Biochemistry and Molecular Biology and specific equipment for DNA quantitation and PCR and qPCR analysis.

3.3.5. CLASSROOM LANGUAGE

Spanish