

30811 - Food chemistry and biochemistry

Syllabus Information

Academic Year: 2020/21

Subject: 30811 - Food chemistry and biochemistry

Faculty / School: 105 - Facultad de Veterinaria

Degree: 568 - Degree in Food Science and Technology

ECTS: 6.0

Year: 2

Semester: First semester

Subject Type: Compulsory

Module: ---

1. General information

1.1. Aims of the course

1.2. Context and importance of this course in the degree

1.3. Recommendations to take this course

2. Learning goals

2.1. Competences

2.2. Learning goals

2.3. Importance of learning goals

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

Evaluation activities

The student must demonstrate that they have achieved the expected learning outcomes through the following assessment activities.

1: Written partial evaluation test, consisting of two questions to be developed in the form of an argued essay, on the syllabus of the first part of the subject (up to topic 13).

2: Written final evaluation test consisting of 6-8 questions to be developed in the form of an argued essay, on the whole of the syllabus. Passing this test will accredit the achievement of learning results 1, 2, 3 and 4.

3: During the development of the class theoretical-practical questions will be formulated that if correctly solved by the student will allow him to obtain up to 2 points that will be added to the global grade obtained in the exam.

4- Preparation of a small memory, of up to 3 pages, on the labels of two processed foods, chosen by the student himself, indicating the most notable chemical characteristics of ingredients and additives, why precisely these and possible alternatives are used.

5- Preparation by groups of 3 students of a memory, of up to 8 pages, on the chemical and biochemical processes that take place in a certain type of food industry, which will be proposed by the teacher

Evaluation criteria

Evaluation criteria and requirement levels

1) The final evaluation written test will consist of an exam in which the answers to between six and eight questions, scored from zero to ten, must be developed in an argued essay.

2) In the event that a final grade higher than 5 is obtained in the final exam, it may be improved by the results obtained in activities 1, 3, 4 and 5. The grades for the two questions of the partial exam (activity 1) and those of activities 4 and 5 will be added to those of the final exam of the first call, averaging with the rest, if the result improves the student's grade, but not otherwise. The grade of point 3 and 4 (up to 1.2 points each) will be added directly to the result of the final exam (only if the grade for this exam is higher than 5) on the first call.

Grading system:

0-4.9: Suspense (SS).

5.0-6.9: Approved (AP).

7.0-8.9: Notable (NT).

9.0-10: Outstanding (SB).

The rating system will be expressed by numerical rating in accordance with the provisions of art. 5 of Royal Decree 1125/2003 of September 5 (BOE September 18), which establishes the European credit system and the system of qualifications for university degrees of an official nature and valid throughout the national territory.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

Food Chemistry and Biochemistry had a 60 hours charge of which 55 correspond to lectures. Taking into account the problem represented by the dissemination of the covid, it is proposed, exceptionally, that the subject be carried out electronically.

In addition to theoretical teaching two activities are planned. A practice to develop within the expected time for this subject (the rest of practical learning will be done seamlessly with the subjects of Analysis Food Chemistry and Physical and Sensory Food Analysis) consists of the olfactory examination of different aromatic substances, in order to appreciate the characteristic odors described in lectures, differentiate different types of aromas and appreciate the qualities of differential nominally similar aromas.

They students will see in practice development of processes and the influence of chemical and biochemical aspects in them. The visits will be coordinated with teachers of other subjects that also perform, to avoid duplication and improve utilization. With one small exception, the practical work of this subject will be coordinated with the subjects of Food Chemical Analysis and Physical and Sensory Food Analysis, so that materials whose preparation would be subject to practical biochemistry (eg, obtaining different polysaccharide gels) are to be used to make the practices of physical analysis, and evaluation of the effect of conditions means on the Maillard reaction or reactions lipid oxidation (biochemistry) are the subject of chemical analysis practices.

Learning activities planned (program included) The program that the student is offered to help you achieve the expected results includes the following activities.

Students must follow the regulations described in:

- Prevention: A guide for students at the University of Zaragoza:
http://uprl.unizar.es/publicaciones/estudiantes_ingles.pdf
- Manual de seguridad en los laboratorios de la Universidad de Zaragoza y normas marcadas por la Unidad de Prevención de Riesgos Laborales:
<http://uprl.unizar.es/seguridad/pdfs/seglaborUZ.pdf>
<http://uprl.unizar.es/seguridad/pdfs/laboratorios.pdf>

In addition, students will follow as well any instructions related to biosecurity given by the professor

4.2. Learning tasks

The course includes the following learning tasks:

- Lecture
- Discussion and analysis of actual cases
- Visits to industries

4.3. Syllabus

The course will address the following topics:

- Section I: Introduction
 - TOPIC 1: INTRODUCTION TO FOOD BIOCHEMISTRY
 - TOPIC 2: THE WATER IN FOOD
- Section II: Enzymes in food
 - TOPIC 3: ENDOGENOUS ENZYMES IN FOOD
 - TOPIC 4: USE OF ENZYMES ALIMENTARIA INDUSTRY
- Section III: Carbohydrates
 - TOPIC 5: MONOSACCHARIDES, OLIGOSACCHARIDES AND THEIR DERIVATIVES
 - TOPIC 6: STARCH AND ITS DERIVATIVES
 - TOPIC 7: INDIGESTIBLE POLISACCHARIDS IN FOOD: CELLULOSE AND PECTINS
 - TOPIC 8: INDIGESTIBLE POLISACCHARIDS FROM OTHER SOURCES

- TOPIC 9: MODIFICATION AND ALTERATIONS OF CARBOHYDRATES
- Section IV: Lipids
 - TOPIC 10: CLASSIFICATION AND PHYSICO-CHEMICAL PROPERTIES OF LIPIDS
 - TOPIC 11: PHYSICAL PROPERTIES OF LIPID: CRYSTALLIZATION AND MELTING
 - TOPIC 12: LIPID ALTERATION
 - TOPIC 13: CHEMISTRY OF INDUSTRIAL PROCESSING OF FATS
- Section V: Proteins
 - TOPIC 14: STRUCTURE AND PHYSICAL AND CHEMICAL PROPERTIES OF PROTEINS
 - TOPIC 15: ALTERATIONS AND MODIFICATIONS OF PROTEIN: DESNATURALIZACIÓN
 - TOPIC 16: OTHER ALTERATIONS AND MODIFICATIONS OF PROTEIN
 - TOPIC 17: FUNCTIONAL PROPERTIES OF FOOD PROTEINS
 - TOPIC 18: THE MUSCLE PROTEIN SYSTEM
 - TOPIC 19: MILK PROTEINS
 - TOPIC 20: EGG PROTEINS
 - TOPIC 21: VEGETABLE PROTEINS
- Section VI: Vitamins and minerals
 - TOPIC 22: VITAMINS IN FOOD
 - TOPIC 23: MINERALS IN FOOD
- Section VII: Other constituents of food
 - TOPIC 24: NATURAL PIGMENTS IN FOOD
 - TOPIC 25: ENZYMATIC BROWNING
 - TOPIC 26: GENETICALLY MODIFIED FOODS
 - TOPIC 27: FOOD COMPONENTS OF FLAVOR AND AROMA
 - TOPIC 28: FOOD ADDITIVES
 - TOPIC 29: BIOACTIVE SUBSTANCES IN FOOD

4.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Facultad de Ciencias web <https://veterinaria.unizar.es/academico/plan-estudios-grado-cta>

4.5.Bibliography and recommended resources

BB Coultate, Tom. Food : the chemistry of its components / Tom Coultate . 6th ed. Cambridge, UK : Royal Society of Chemistry, cop. 2016

BC Fennema's food chemistry / [edited by] Srinivasan Damodaran, Kirk Parkin, and Owen R. Fennema. . - 4th ed. Boca Raton : Taylor & Francis, 2007.

BC Velisek, Jan. The chemistry of food / Jan Velisek. . Chichester : John Wiley & Sons, 2014.