

30811 - Food chemistry and biochemistry

Syllabus Information

Academic year: 2024/25

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

This subject aims to provide the student with a systematized set of knowledge on the chemistry and biochemistry of foods, highlighting aspects of special interest to the food industry. Emphasis is therefore placed on the organoleptic and functional properties of the various components, as well as on the changes that occur in the food during its preparation, processing, storage and cooking. In addition, the mechanisms involved in spoilage reactions and in those that operate in beneficial changes in food are studied.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the Agenda 2030 of United Nations , 2: Zero hunger; 3: Health and wellness; 12: Responsible production and consumption.

2. Learning results

In order to pass this subject, the students shall demonstrate they has acquired the following results:

1: Knows the main chemical and biochemical reactions involved in the modification of the components of food, the mechanisms involved, and the influence that environmental conditions have on them.

2: Is able to plan treatments, alternative treatments and changes in the usual treatment conditions to modify the course of these reactions.

3: is able to choose ingredients, additives, or treatments to condition the course of these reactions when formulating a complex food.

4: Knows the nutritional, organoleptic and health effects of the chemical and biochemical reactions that can take place in foods, and the methods to evaluate these effects.

3. Syllabus

Chapter I: Introduction

TOPIC 1: INTRODUCTION TO FOOD BIOCHEMISTRY

TOPIC 2: WATER IN FOOD

Chapter II: Enzymes in food

TOPIC 3: ENDOGENOUS FOOD ENZYMES

TOPIC 4: BASIS FOR THE USE OF ENZYMES IN THE FOOD INDUSTRY

Chapter III: Carbohydrates

Topic 5: monosaccharides, oligosaccharides and their derivatives

TOPIC 6: STARCH AND ITS DERIVATIVES

TOPIC 7: NON-DIGESTIBLE POLYSACCHARIDES FROM FOODS: CELLULOSE AND PECTINS

TOPIC 8: NON-DIGESTIBLE POLYSACCHARIDES EXTRACTED FROM OTHER SOURCES

TOPIC 9: CARBOHYDRATE MODIFICATIONS AND ALTERATIONS

Chapter IV: Lipids

TOPIC 10: CLASSIFICATION AND PHYSICOCHEMICAL PROPERTIES OF LIPIDS

TOPIC 11: PHYSICAL PROPERTIES OF LIPIDS: CRYSTALIZATION and FUSION

TOPIC 12: LIPID DISORDERS

TOPIC 13: CHEMISTRY OF INDUSTRIAL PROCESSING OF FATS

Chapter V: Proteins

- TOPIC 14: STRUCTURE AND PHYSICOCHEMICAL PROPERTIES OF PROTEINS
- TOPIC 15: PROTEIN ALTERATIONS AND MODIFICATIONS: DESNATURALIZATION
- TOPIC 16: OTHER PROTEIN MODIFICATIONS AND ALTERATIONS
- TOPIC 17: FUNCTIONAL PROPERTIES OF ALLOYMENTARY PROTEINS
- TOPIC 18: THE MUSCULAR PROTEIN SYSTEM
- TOPIC 19: MILK PROTEINS
- TOPIC 20: EGG PROTEINS
- TOPIC 21: VEGETABLE PROTEINS

Chapter VI: Vitamins and minerals

- TOPIC 22: VITAMINS IN FOOD
- TOPIC 23: MINERALS IN FOOD

Chapter VII: Other food constituents

- TOPIC 24: NATURAL PIGMENTS AND FOOD COLOR
- TOPIC 25: ENZYMATIC BROWNING
- TOPIC 26: FUNDAMENTALS OF TRANSGENIC FOODS
- TOPIC 27: AROMA AND FLAVOR COMPONENTS OF FOOD
- TOPIC 28: ADDITIVES
- TOPIC 29: BIOACTIVE SUBSTANCES PRESENT IN FOOD

4. Academic activities

The subject has a classroom load of 60 hours, 59 of which correspond to participative lectures.

In addition to the theoretical teaching, a one-hour practical session is scheduled, consisting of the olfactory examination of different aromatic substances, in order to be able to appreciate the characteristic odours described in the theoretical classes, to differentiate types of aromas and to appreciate the differential qualities of nominally similar aromas.

The rest of the practical learning will be carried out in an integrated way with the subjects of Chemical Analysis of Food and Physical and Sensory Analysis of Food. Outside the time allotted for classroom activities, visits to food companies will be scheduled, depending on the possibilities ; attendance to these visits will be voluntary.

5. Assessment system

- 1) The final assessment written test will consist of an exam in which the answers to between six and eight questions, each graded from zero to ten, must be developed in the form of an essay , with arguments. The grade for this test will be the average.
- 2) In the event that a grade higher than 5 is obtained in the final exam, this grade may be improved by the results obtained in the following complementary activities.
 - 1: Written midterm exam, 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). The grades for these questions will be added to those of the final exam only if they improve the average.
 - 2: During the development of the class, theoretical and practical questions will be formulated which, if correctly solved by the student, will allow them to obtain up to 2 points (in fractions of 0.5) which will be added to the overall grade obtained in the exam.
 - 3: Preparation of a short report, up to 3 pages, on the labels of two processed foods, chosen by the student, indicating the most notable chemical characteristics of ingredients and additives, why specifically these are used and possible alternatives. Up to 0.5 points may be added to the final grade.

The grades of the complementary activities are only added directly in the first call, although the reports indicated in point 3 can be submitted (the same, modified or totally different ones) again for a second call.

6. Sustainable Development Goals

- 2 - Zero Hunger
- 3 - Good Health & Well-Being
- 12 - Responsible Production and Consumption