

## 27132 - Biochemistry of Nutrition

### Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	6.0
Course	4
Period	Second semester
Subject Type	Optional
Module	---

### 1. Basic info

#### 1.1. Recommendations to take this course

#### 1.2. Activities and key dates for the course

For students enrolled in the subject, places, times and dates of lectures and practical sessions will be public via Bulletin Board advertisements of the grade on the platform Moodle at the University of Zaragoza, <https://moodle2.unizar.es/add/>, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: <https://ciencias.unizar.es/grado-en-biotecnologia>.

In this web there will be also available the dates of exams.

### 2. Initiation

#### 2.1. Learning outcomes that define the subject

#### 2.2. Introduction

### 3. Context and competences

#### 3.1. Goals

#### 3.2. Context and meaning of the subject in the degree

#### 3.3. Competences

#### 3.4. Importance of learning outcomes

### 4. Evaluation

### 5. Activities and resources

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### 5.1. General methodological presentation

**The learning process designed for this subject is based on the following:**

Training activity 1: Acquisition of basic knowledge through participatory lectures and delivery of two seminars by experts on the subject. 3.0 ECTS. Classes will be conducted by combining the use of the blackboard and presentations of "Power Point". Students will have at their disposal presentations corresponding to the lectures at the ADD. Presentations will include direct links to websites that offer educational materials related to the topic that is being exposed. In this sense, the recommended books (see below) have websites associated very appropriate.

Training activity 2: Preparation of problems and exercises by students and resolution in the classroom. 0.5 ECTS. Problems and exercises will be available before school started in the ADD.

Training activity type 3. Practical classes in the laboratory. 1.2 ECTS. Three sessions of 4 hours each.

Training activity type 4 Seminars: Exposition and public defense of a scientific paper on a topic related to the subject. It will be done individually or in groups of 2 students. The work will be exposed and defended by each group of students in seminar sessions, in which the exponents should intervene to explain and argue some of the points of work and debate them and discuss them with other seminar participants (teachers and students). The time available for the presentation and defense of the topic during the seminar sessions will be 15 minutes. 1.3 ECTS.

### 5.2. Learning activities

The program that the student is offered to help you achieve the expected results includes the following activities ...

Training activity 1. Lectures and expert seminars

Training activity 2. Classes of problems and calculations of energy needs

Training activity 3. Seminars presented by the students.

These three training activities follow the program content.

Seminars by experts:

"Nutrition and Cancer". Dr. Javier Naval. Dpt. Biochemistry and Cellular and Molecular Biology. University of Zaragoza.

"Effects of diet on gene expression." Dr. José María Ordovás. Human Nutrition Research Center on Aging. Tufts University, USA. Confirmation pending

Training activity 4. Lab practical program:

1st session. Presence of vitamins in biological materials

2nd session. Characterization of fats and oils

3rd session. Determination of cholesterol in foods.

### 5.3. Program

#### Program

1. Global vision. Nutrition concept. Food classification. energy needs. Balance diet. Dietary changes. Metabolic stress syndrome.

2. Food as fuel. bomb calorimeter. Types of energy. futile cycles. Direct and indirect calorimetry. respiratory quotient. Basal metabolic energy expenditure. Lean body mass. Basal metabolic disorders. dynamic-specific action of food. Physical activity. Loss calculations and weight gain. Analysis of labels

3. Carbohydrate nutrition. Classification and nutritional function. Foods rich in carbohydrates. Gluten intolerance. Digestion, absorption, and metabolism. Glycemic control. Disaccharide malabsorption diet.

4. Intestinal microbiome and Nutrition. Formation and characteristics. Enterotypes. Fiber. Fiber digestion. Microbiome and obesity.

5. Pathological aspects. Caries. Edulcorantes. Metabolismo energy in situations of fasting and feeding. Destination of sugars, proteins, fats. hormonal regulation. Diabetes. Glycemic index.

6. Lipids in food. Dietary fat: fatty acids, triglycerides, phospholipids, cholesterol. Fats and oils. Emulsions. Oil refining. Hydrogenating oils. Rancidity. Eqns.

7. Lipid nutrition. Digestion, absorption, distribution and metabolism. Role of dietary lipids on cardiovascular disease.

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Fatty acids, cholesterol. Phytosterols. Formation of atherosclerotic plaque. Physiological effects of derivatives (autacoids) of the AG n-3 and n-6.

8. Nutrigenomics and nutrigenomics regulation of gene expression by lipids. Modulating the expression of PPAR, LXR SREBP-kB and NF. genetic polymorphisms.

9. Mediterranean diet. Phenolic compounds. Alcohol. Functional Foods.

10. Nutrition protein. Functions. Essential amino acids. Protein quality. limiting amino acid. Digestibility. biological value. protein turnover. Protein needs. Digestion, absorption and metabolism of proteins. Nitrogen balance. protein malnutrition. Cachexia. Errors of metabolism of amino acids.

11. Assessment of nutritional status and obesity. anthropometric indicators. Rating protein and body fat. Ideal weight. biochemical indicators. Obesity. associated risks. Body mass index. Waist / hip ratio. Obesity and Diabetes Prevalence trends. Benefits of weight loss. Etiology of obesity: biological and behavioral factors.

12. Mechanisms intake regulation. Satiety signals in the short and long term. uncoupling proteins. epigenética. Efectos regulation of diets designed for weight loss.

13. Exercise. metabolic adaptation to exercise. aerobic and anaerobic systems at rest and exercise. dietary factors and physical activity

14. Vitamins and minerals. History. Classification. Causes of deficiency. Vitamin supplements. Mito. Vitaminas Hidrosolubles. Fat-soluble vitamins. vegetarian diets. Macro- and microelements.

### 5.4. Planning and scheduling

#### Planning and scheduling

Schedules of lectures and problems will coincide with the officially established and will be available at: <https://ciencias.unizar.es/grado-en-biotecnologia>.

The places, calendar and groups for training and practical sessions will be established in coordination with the rest of matters at beginning of course. The Coordinator will produce the groups of students for these activities at beginning of course to avoid overlaps with other subjects.

Tutorial schedule: Monday and Wednesday 12-2h.

### 5.5. Bibliography and recommended resources