

## 27132 - Biochemistry of Nutrition

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	6.0
Year	4
Semester	Second semester
Subject Type	Optional
Module	---

### 1.General information

#### 1.1.Introduction

#### 1.2.Recommendations to take this course

#### 1.3.Context and importance of this course in the degree

#### 1.4.Activities and key dates

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.Learning goals

#### 2.1.Learning goals

#### 2.2.Importance of learning goals

### 3.Aims of the course and competences

#### 3.1.Aims of the course

#### 3.2.Competences

### 4.Assessment (1st and 2nd call)

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

## **5. Methodology, learning tasks, syllabus and resources**

### **5.1. Methodological overview**

The methodology followed in this course is oriented towards achievement of the learning objectives. It favors the acquisition of knowledge related to Nutritional Biochemistry and Metabolism focused to health. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, and assignments.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

### **5.2. Learning tasks**

The course includes 6 ECTS organized according to:

- Theory sessions (3.8 ECTS): 38 hours.
- Laboratory sessions (1.2 ECTS): 12 hours.
- Assignments (1.0 ECTS): 10 hours.
- Autonomous work (7.5 ECTS): 75 hours.
- Tutorials (9 ECTS): 90 hours.
- Assessment( 0.2 ECTS): 2 hours.

**Theory sessions:** the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended. Two seminars 1-2 hours will be imparted by experts on the subject

**Laboratory sessions:** sessions will take place in a week (3 sessions in total) and last 4.0 hours each. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

**Assignments:** students will elaborate an essay (including bibliographical research, analysis, summary, scientific rigor, coherence of expression and citations) and defend it orally. It will be done individually or in groups of 2 students.

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Autonomous work: students do tasks such as autonomous study, preparation of practice sessions and seminars, and summative assignments.

Tutorials: professors' office hours can be used to solve doubts and to follow-up students' work.

Assessment: final examination

### 5.3.Syllabus

The course will address the following topics:

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. 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.

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### **5.4.Course planning and calendar**

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Facultad de Ciencias" website: <https://ciencias.unizar.es/grado-en-biotecnologia>.

### **5.5.Bibliography and recommended resources**