

Academic Year/course: 2022/23

27132 - Biochemistry of Nutrition

Syllabus Information

Academic Year: 2022/23

Subject: 27132 - Biochemistry of Nutrition

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. Aims of the course

The course and its expected results follow this approaches and objectives:

It is an optional subject of the Advanced Degree Module. The general objective is to provide to students the basic knowledge about energetic needs, nutrients, nutigenomic, microbiome and his relationship with chronic diseases that comprise the metabolic syndrome.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda: Goals 3, Health and wellness and 12, Responsible production and consumption (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to a certain extent to its achievement ?.

1.2. Context and importance of this course in the degree

The Biochemistry of Nutrition provides a Biotechnology student a practical approach to Biomedicine, addressing the nutrient-disease relationship. The student should relate this knowledge to those already acquired from Biochemistry, Genetics, Immunology, and Physiology, which as a whole, can guide students towards this field of great interest and with great possibilities for expansion in the near future.

1.3. Recommendations to take this course

It is essential to have studied General Biochemistry and it is highly recommended to have passed the following subjects It is recommended to have passed a course in Biochemistry, Genetics, Immunology, and Physiology.

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. It facilitates the acquisition of knowledge related to Nutritional Biochemistry and Metabolism focused on 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.

4.2. Learning tasks

"The teaching and assessment activities will be carried out in person unless, due to the health situation, the provisions issued by the competent authorities and by the University of Zaragoza provide for them to be carried out electronically."

The course will include the following learning tasks: Lecture notes and a set of problems (and their corresponding solutions) will be available for the students. At the end of each topic, some of the problems will be solved in a class by the teacher and the rest will be done individually. Various seminars, 5 hours will be imparted by experts on the subject.

- Lectures (3.2 ECTS: 32 hours). Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.
- Problems sessions (0.3 ECTS: 3 hours).
- Seminars given by experts (0,5 ECTS: 5 hours)
- Laboratory sessions (1.2 ECTS: 12 hours). four-hour sessions that take place approximately, 3 sessions in total, in Lab 3 building D. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods. Students are provided in advance with task guidelines for each session.
- Assignments (0.8 ECTS: 8 hours). Students will elaborate on a topic (including bibliographic research, analysis, summary, scientific rigor, coherence of expression, and citations) and will defend it orally. They will have a maximum of 15 minutes to present the topic and it will be followed by a 5-minute discussion. It will be done individually or in groups of 2 students.

4.3. 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.
4. Intestinal microbiome and Nutrition. Formation and characteristics. Enterotypes. Microbiome and obesity.
5. Fiber. Functions. Classification. Properties. Lignine.
6. Pathological aspects. Dental caries. Sweeteners. Energetic metabolism at fasting and feeding. Sugar, proteins and fat destination. Hormonal regulation. Diabetes. Glycemic index.
7. Lipids in food. Dietary fat: fatty acids, triglycerides, phospholipids, cholesterol. Fats and oils. Oil refining. Hydrogenating oils. Rancidity. Eqns.
8. 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 PUFA n-3 and n-6. derivatives (autacoids).
9. Mediterranean diet. Phenolic compounds. Alcohol. Functional Foods.
10. Nutritional Genomic. Nutrigenetic. Genetic polymorphisms. Nutrigenomic. Nutrigenomic regulation of gene expression by lipids. Modulating the expression of PPAR, LXR SREBP-kB, and NF-kB
11. 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.
12. Assessment of nutritional status and obesity. Anthropometric indicators. Biochemical indicators. Body mass index. Waist/hip ratio. Obesity and Diabetes. Etiology of obesity: biological and behavioral factors.
13. Mechanisms intake regulation. Satiety signals at short and long term. Uncoupling proteins. Epigenetic. Diets designed for weight loss.
14. Exercise. Metabolic adaptation to exercise. Aerobic and anaerobic systems. Dietary factors and physical activity
15. Vitamins. History. Classification. Deficiency. Vitamin supplements. Water and fat-soluble vitamins.
16. Minerals. Macro- and microelements. Vegan diets.

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" website and the department website: <https://ciencias.unizar.es/grado-en-biotecnologia>.

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 the website there will be also available the dates of exams.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27132>