Universidad Zaragoza

Year : 2019/20

27132 - Biochemistry of Nutrition

Syllabus Information

Academic Year: 2019/20
Subject: 27132 - Biochemistry of Nutrition
Faculty / School: 100 -

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, microbiome and his relationship with chronic diseases that comprise the metabolic syndrome.

1.2.Context and importance of this course in the degree

The Biochemistry of Nutrition provides at Biotechnology student a practical approach to Biomedicine, deepening in the nutrient-disease relationship. The student must relate this knowledge to those already acquired from Genetics, Immunology and Physiology and it 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 recommended to have passed a course in Biochemistry, Genetics, Immunology and Physiology.

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)

4.Methodology, learning tasks, syllabus and resources

4.1.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.

4.2.Learning tasks

The course will includes the following learning tasks:

- Lectures (3.8 ECTS: 38 hours). 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 class by the teacher and the rest will be done individually. 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 (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 (1 ECTS: 10 hours). In pairs, students work on lab reports and different assignments during the course. The students will present a topic related to the syllabus of the subject (including bibliographical research, analysis, summary, scientific rigor, coherence of expression and citations)
- Autonomous work (7.5 ECTS: 75 hours). Students do tasks such as autonomous study, preparation of practice sessions and seminars, and summative assignments.
- Tutorials: professors' office hours can be used to solved doubts and to follow-up students' work.
- Assessment: final examination

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.Fiber.
5. Pathological aspects. Dental caries. Sweeteners. Energetic metabolism at fasting and feeding. Sugar, proteins and fat destination. Hormonal regulation. Diabetes. Glycemic index.
6. Lipids in food. Dietary fat: fatty acids, triglycerides, phospholipids, cholesterol. Fats and oils. 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 PUFA n-3 and n-6. derivatives (autacoids).
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. Biochemical indicators. Body mass index. Waist / hip ratio. Obesity and Diabetes. Etiology of obesity: biological and behavioral factors.
12. Mechanisms intake regulation. Satiety signals at short and long term. Uncoupling proteins. Epigenétic. Diets designed for weight loss.
13. Exercise. Metabolic adaptation to exercise. Aerobic and anaerobic systems. Dietary factors and physical activity
14. Vitamins and minerals. History. Classification. Deficiency. Vitamin supplements. Water and fat-soluble vitamins. 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://biblos.unizar.es/br/br_citas.php?codigo=27132&year=2019