

Academic Year/course: 2022/23

29231 - Molecular Biology and Human Nutrition

Syllabus Information

Academic Year: 2022/23

Subject: 29231 - Molecular Biology and Human Nutrition

Faculty / School: 229 - Facultad de Ciencias de la Salud y del Deporte

Degree: 441 - Degree in Human Nutrition and Dietetics

ECTS: 6.0

Year: 4

Semester: First semester

Subject Type: Optional

Module:

1. General information

1.1. Aims of the course

Molecular Biology and Human nutrition is an optative subject that aims to provide the students with basic knowledge about genetic material and the available research tools to study it. In addition, this subject aims to deeper understand the relationship between genetic material and nutrients. In this way, students will be aware of the advances, controversies and challenges that the discoveries in Molecular Biology generate in the field of Human Nutrition.

These goals are in the line of the following ODS of the United Nations Agenda (

<https://www.un.org/sustainabledevelopment/es/>): 3 y 12, so that the acquisition of the learning results from this subject will provide the skills to achieve these goals to a certain extent.

1.2. Context and importance of this course in the degree

Molecular Biology and Human Nutrition is an optative subject of the forth year of the degree on Human Nutrition and Dietetics. The specific skills and knowledge provided by this subject is unique and allow the students to acquire new insights into such a relevant and up-to-day topic as Nutritional Genomics.

Nutritional Genomics studies the interaction between nutrients and genome and can be divided in two disciplines. Nutrigenomics is focused in understanding the effect of nutrients on the genome, studying processes like gene expression, cellular homeostasis, protein and metabolite production...etc. Nutrigenetics analysis how the genetic variation influences the body response to different nutrients.

Students can complement their comprehension on Human Nutrition. Thus, the knowledge acquired with this subject will allow them to broaden the basic scientific knowledge and the applications of their profession.

1.3. Recommendations to take this course

It is highly recommended to attend to lectures and practical courses as well as to actively participate in all proposed activities and use the offered tutorials. It is recommended to have taken and passed the courses: Structural Biochemistry and Metabolism and Gene Expression (First year).

2. Learning goals

2.1. Competences

- To learn how gene expression and regulation are regulated by nutrients.
- To learn the influence of genetic background on nutritional needs and response to nutrients.
- To recognise the need of keep and update professional competences, with special attention to autonomous and continuous learning of new concepts, products and techniques related to nutrition and feeding, as well as

implementing quality.

- To know, learn how to correctly use and apply scientific sources related to nutrition, feeding, life style and health-related aspects.
- To improve scientific research skills, being able to generate hypothesis, collect and understand information to solve problems following the scientific method in that way understanding as well the limitations of the scientific method applied to health-related and nutritional aspects.

2.2. Learning goals

- Being aware how gene expression and regulation are regulated by nutrients and to be able to show this knowledge.
- Being aware of how the influence of genetic background on nutritional needs and response to nutrients and to be able to show this knowledge.
- Being aware of the need of keep and update professional competences, with special attention to autonomous and continuous learning of new concepts, products and techniques related to nutrition and feeding, as well as implementing quality and to be able to show this knowledge.
- Being aware how to correctly use and apply scientific sources related to nutrition, feeding, life style and health-related aspects and to be able to show this knowledge.
- Being able to show scientific research skills, being able to generate hypothesis, collect and understand information to solve problems following the scientific method in that way understanding as well the limitations of the scientific method applied to health-related and nutritional aspects.

2.3. Importance of learning goals

Apart from its best known issues (like energetic requirements or deficiency conditions) Nutrition is nowadays reaching an increasing interest since it is being recognised as a risk/susceptibility factor affecting health in individuals and populations. At the same time, our understanding of nutritional processes at a molecular level is continuously increased as a result of new biological and biomedical investigations and can lead to new dietary trends or new food products.

As a result of studies on Nutritional genomics, personalised nutrition has evolved, based in the susceptibility to suffer or not a disease to provide with a much more personalized nutritional intervention. Moreover, food with a potential beneficial role are being studied. This outcome is being achieved by the direct work of Human Nutrition specialists.

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. A wide range of teaching and learning tasks are implemented, such as lectures, seminars, laboratory sessions and computer sessions.

The aim of this course is to introduce the student to this new field of Genomic Nutrition, at the same time the student achieves skills and knowledge that will help to understand the present situation and the future challenges of Human Nutrition.

4.2. Learning tasks

This course is organized as follows:

- **Lectures** (4.4 ECTS). Lectures cover the basics of the course. The primary emphasis is on transmitting a body of knowledge or information and explaining ideas or principle. Students may be expected to participate in classroom activities * Lectures will be taught online, by teachers and students synchronously, through technologies that allow interaction (Google Meet).
- **Practice sessions** (1.6 ECTS):
 - Laboratory sessions: Experimental tasks carried out in small groups, under the supervision of the professor. The purpose is the application of methods and principles related to the course.
 - Seminars: Conducted to give students an opportunity to make a presentation on a researched topic to the rest of the class, under the direction of the professor.

4.3. Syllabus

This course will address the following topics:

Lectures

- Unit 1. Introduction to nutritional genomics
- Unit 2. Gene and DNA structure
- Unit 3. Gene expression and regulation
- Unit 4. Gene inheritance and transmission. Genetic variability
- Unit 5. Genes and disease
- Unit 6. Molecular methods used in nutritional genomics
- Unit 7. Nutrients and epigenetics
- Unit 8. Microbiome, diet and health
- Unit 9. Genetic variability and nutrition
- Unit 10. Personalized nutrition
- Unit 11. Ethical and legal issues surrounding nutrigenomics
- Unit 12. Nutrients and gene expression
- Unit 13. Nutrigenomics and nutrigenetics in ageing and calorie restriction
- Unit 14. Nutrigenomics and nutrigenetics in cardiovascular disease
- Unit 15. Nutrigenomics and nutrigenetics in obesity
- Unit 16. Nutrigenomics and nutrigenetics in cancer

Laboratory sessions

- 1. DNA extraction
- 2. Gene amplification by polymerase chain reaction (PCR)
- 3. Analysis by gel electrophoresis
- 4. Bioinformatics

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 Faculty of Health and Sport Sciences website and Moodle.

Timetable of on-site sessions and exams: (<https://fccsyd.unizar.es/academico/horarios-y-calendarios>)

4.5. Bibliography and recommended resources

<https://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29231>