

Academic Year/course: 2021/22

## 29240 - Metabolism and Gene Expression

### Syllabus Information

**Academic Year:** 2021/22

**Subject:** 29240 - Metabolism and Gene Expression

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

**Degree:** 441 - Degree in Human Nutrition and Dietetics

**ECTS:** 8.0

**Year:** 1

**Semester:** Second semester

**Subject Type:** Basic Education

**Module:**

### 1. General information

### 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. A wide range of teaching and learning tasks are implemented, such as participatory lectures, laboratory sessions, problem solving sessions and assignments.

This is a basic course which treats that students assimilate and use in a proper manner the biochemical and molecular concepts related to nutritional and physiological processes.

#### 4.2. Learning tasks

This course is organized as follows:

- **Lectures** (60 hours). Students will be provided with the essential concepts, the scientific vocabulary and the metabolic and molecular view necessary to understand the enzymatic processes that happen in the cells to obtain energy from food or to use this energy in biosynthetic pathways. \* Lectures will be taught online, by teachers and students synchronously, through technologies that allow interaction (Google Meet).
- **Practice sessions** (12.5 hours). 5 sessions; 2.5 hour/each. They include laboratory sessions and problems solving, so that students can apply theoretical concepts to solve new situations and they can achieve a less superficial understanding of reality.
- **Assignments**. The preparation and public presentation of a scientific essay will allow students to understand and expose the knowledge included in a scientific publication. This activity can help the students to learn how important is to increase and to update our knowledge constantly. Besides, the public exposition of the work, will be good for students to face other difficulties of this activity and it is a chance for evaluate their personal work.
- **Seminars** (6 hours). 3 sessions, 2 hours/each in which the students will present their assignments. The students will make a presentation on a research topic related to nutrition.

#### 4.3. Syllabus

This course will address the following topics:

#### Lectures (60 hours)

##### **Section I. THE CELL:**

- Unit 1.- Biomembranes.
- Unit 2.- The nucleus.
- Unit 3.- DNA replication and repair
- Unit 4.- From DNA to RNA: transcription and regulation of gene expression.
- Unit 5.- Translation to proteins.
- Unit 6.- Organelles.
  - 6a. Protein distribution and transport: Endoplasmic reticulum, Golgi apparatus and lysosomes.
  - 6b. Bioenergetics and metabolism: Mitochondria, chloroplasts and peroxisomes.
- Unit 7.- Cytoskeleton.
- Unit 8.- Cell division and cell cycle.
- Unit 9.- Cell signalling, differentiation y oncogenesis.

##### **Section II. ENZYMES:**

- Unit 10.- Enzymes kinetics and action mechanisms.
- Unit 11.- Modification and regulation of enzymatic activity.

##### **III. METABOLISM:**

- Unit 12.- Introduction to metabolism.
- Unit 13.- Photosynthesis.
- Unit 14.- Glucose oxidation pathways.
- Unit 15.- Citric acid cycle.
- Unit 16.- Oxidative phosphorylation.
- Unit 17.- Carbohydrate biosynthesis.
- Unit 18.- Glycogen metabolism.
- Unit 19.- Fatty acids oxidation.
- Unit 20.- Fatty acids and triacylglycerols biosynthesis.
- Unit 21.- Metabolism of complex lipids.
- Unit 22.- Amino acid metabolism.
- Unit 23.- Nucleotide metabolism.
- Unit 24.- Metabolic integration and control.

#### Laboratory sessions (12.5 hours)

- Cell diversity
- DNA extraction and purification
- Determination of protein concentration
- Measurement of enzyme activity
- Lipid metabolism

#### **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 (<https://fccsyd.unizar.es/academico/horarios-y-convocatorias>) and Moodle.

#### **4.5. Bibliography and recommended resources**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29240>