REGULATION AND INTEGRATION OF METABOLISM

Human Nutrition and Dietary Sciences

ACADEMIC YEAR 2026-27

Code: 803979
Module: 1
Subject: Biochemistry
Type of Subject: Basic
Year: First
Semester: check calendar
Department: Biochemistry and Molecular Biology
Credits: 6 ECTS

TEACHING STAFF

Mª Angeles Navas Hernández (manavas@ucm.es)
Mª Concepción García García

BRIEF DESCRIPTOR

This course aims to provide students with an up-to-date overview of the various aspects that make up the field of Regulation and Integration of Metabolism in Human Nutrition.

COMPETENCIES

Competencies corresponding to the module and subject matter are as follows:

General

- C.G.1.1.
- C.G.1.2.
- C.G.1.3.
- C.G.1.4.
- C.G.2.1.
- C.G.2.2.
- C.G.2.3.
- C.G.4.1.
- C.G.8.1

Specific competencies

- CE.M1.1.
- CE.M1.2.
- CE.M1.5.
- CE.M1.7.
- CE.M4.03.
- CE.M4.06.
- CE.M4.08.
- CE.M4.11.
- CE.M4.22

OBJECTIVES

The aim of this module is to explore the most important aspects of intermediate metabolism, its integration and the mechanisms governing its regulation, from a biochemical and molecular biological perspective, in order to understand how it adapts to different physiological and nutritional conditions.

THEORETICAL PROGRAM

1. Molecular genetics

•Molecular and functional characteristics of nucleic acids: DNA and RNA.

•Molecular mechanisms of replication, transcription and translation of genetic information.

•Molecular mechanisms involved in the regulation of gene expression.

2. Metabolic Regulation

•Overview of metabolic pathways.

•Regulatory mechanisms.

•Biochemical mechanisms of hormonal action.

•Intracellular mechanisms of signal transduction in cell communication.

3. Integration of Metabolism

•Metabolism of liver tissue.

•Metabolism of muscle.

•Metabolism of the kidney and other organs and tissues.

•Integrated metabolic responses

TEACHING METHODOLOGY

Lectures: Oral presentation of the syllabus topics by the lecturer.

Supplementary classes and seminars: aimed at enhancing knowledge and refining verbal and written communication on various topics related to the regulation and integration of metabolism and its relationship with human nutrition.

Practical laboratory sessions: Students will carry out experimental work to learn basic biochemistry techniques.

Working groups: Students will be divided into working groups. The topics of study will relate to specific subjects proposed by the lecturer. Students will present the results obtained from their work. Prior to the presentation, they must prepare a summary containing the most relevant points of the presentation and the bibliography used, which must be submitted to the lecturer in electronic format.

EVALUATION CRITERIA

Assessment will be weighted, taking into account the skills demonstrated by the student in the following areas:

- Theoretical content.
- Practical content.
- Specific assignments.
- Presentations.

Theoretical content will be assessed through written examinations on the subject matter included in the syllabus.

Attendance at, completion of and passing the laboratory practicals are compulsory for passing the module. Practical work will be marked as ‘pass’ or ‘fail’. Students who do not achieve a ‘pass’ mark will not be able to pass the module, even if they have passed the theoretical exam and the other assessed activities. If necessary, a resit exam for the practicals will be held prior to the official exam sessions.

Assignments and presentations will be assessed on the basis of the work carried out by the student under the supervision of the course lecturers.

Continuous assessment will take place during theory classes and seminars. Students’ attendance and contributions to discussions will be taken into account.

BIBLIOGRAPHY

1. Müller-Esterl W, Brandt U. Bioquímica: fundamentos para medicina y ciencias de la vida. Reimpresión enero 2025. Barcelona: Reverté; 2025.
2. Nelson DL, Cox MM, Hoskins AA. Lehninger principles of biochemistry. 8th ed. New York: Macmillan Learning; 2021.
3. Voet D, Pratt CW, Voet JG. Fundamentos de bioquímica: la vida a nivel molecular. 4ª ed. Buenos Aires [etc.]: Médica Panamericana; 2016.
4. Mathews CK, González de Buitrago JM. Bioquímica. 4a. ed. Madrid: Pearson Educación; 2013.
5. Baynes JW, Dominiczak MH. Bioquímica médica. [6th edition]. [Place of publication not identified]: Elsevier; 2024. Available from: http://www.clinicalkey.com/student
6. Devlin TM. Bioquímica: libro de texto con aplicaciones clínicas. 4ª ed. [reimp.]. Barcelona, ed. Reverté; 2015.
7. Mathews CK, González de Buitrago JM. Bioquímica. 4a. ed. Madrid: Pearson Educación; 2013.
8. Stryer LL, Berg JM, Tymoczko JL. Bioquímica. Curso Básico. Barcelona: Editorial Reverté; 2020. Available from: http://public. ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=29197480
9. Watson JD. Biología molecular del gen. Ed. española , [traducida de la 7ª ed. en inglés]. México D.F.: Editorial Médica Panamericana; 2016.
10. Pierce BA. Fundamentos de genética: conceptos y relaciones. Quinta edición. Madrid: Editorial Médica Panamericana; 2022.