MOLECULAR ANIMAL PHYSIOLOGY

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<td>Physiological integration and application of biochemistry and molecular biology</td>
<td>Molecular Animal Physiology</td>
<td>2nd</td>
<td>3rd</td>
<td>6 ECTS</td>
<td>Required (Mandatory)</td>
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**LECTURER(S)**

Dr. Maria Alba Martinez Burgos (T *, P *)  
(Coordinator for the subject)

(T *: Theory; P *: Practice)

**DEGREE WITHIN THE SUBJECT IS TAUGHT**

Degree in Human Nutrition and Dietetics

**TUTORING AND MEETINGS**

Dr. Maria Alba Martinez Burgos (malbamgr.es):  
Monday, Tuesday and Thursday: 9-11h, in the office of the Faculty of Sciences

**PREREQUISITES and/or RECOMMENDATIONS (if necessary)**

**Prerequisites:** Organic Chemistry; Cell Biology; Fundamentals of Biochemistry; Macromolecular Structures  
**Recommendations:** A good standard of English and informatics skills are also required.

**BRIEF ACCOUNT OF THE SUBJECT PROGRAMME**

- General and cell physiology. Concept and content of physiology. Homeostasis.
- Molecular physiology of epithelial tissues.
- Molecular physiology of oxidative stress.
- Molecular physiology of the regulation of intracellular calcium concentration.
- Muscle Physiology.
- Respiratory function.
- Renal function and excretory system.
- Physiology of the circulatory system and cardiovascular function.
- Introduction to the physiology of the nervous system.
- Physiology of blood.
- Physiology of the senses.
- Physiology of the digestive system. Nutrition.
- Introduction to endocrine physiology. Neuroendocrine integration.
- Introduction to the physiology of sex determination and differentiation.
- Integration and adaptation of the organism to various physiological conditions.
- Introduction to the physiology relationship.
- Introduction to Physiome. Computational models.

### GENERAL AND PARTICULAR ABILITIES

#### GENERAL ABILITIES:

- **BASIC SKILLS:**

  - CB3: That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.
  - CB5: Students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

- **GENERAL COMPETENCES:**

  - CG3: Acquire the ability to gather and interpret relevant data within the area of Biochemistry and Molecular Biology, as well as to draw conclusions and critically reflect on them in different relevant topics in the field of Molecular Biosciences.
  - CG5: To have developed the necessary learning skills to undertake further studies of specialization with a high degree of autonomy, including the capacity of assimilation of the different scientific and technological innovations that are occurring in the field of Molecular Biosciences.

- **CROSS-COMPREHENSIVE COMPETENCES:**

  - CT2: Know how to work in a team in a collaborative and shared responsibility.
  - CT3: Have an ethical commitment and concern for professional ethics.
  - CT4: To have learning capacity and autonomous work.
  - CT6: Knowing how to recognize and analyze a problem, identifying its essential components, and planning a scientific strategy to solve it.
  - CT7: Know how to use the basic computer tools for communication, information search, and data processing in your professional activity.
  - CT9: Know how to communicate scientific information in a clear and effective manner, including the ability to present oral and written work to a professional audience, and to understand the language and proposals of other specialists.

- **SPECIFIC COMPETENCES:**

  - CE9: Understand the main physiological processes of multicellular organisms, with special emphasis on the human species, as well as understand the molecular basis of these physiological processes.
  - CE11: To have an integrated vision of cellular functioning (including metabolism and gene expression), encompassing its regulation and the relation between different cellular compartments
  - CE12: To have an integrated vision of the systems of intercellular communication and intracellular signaling that regulate the
proliferation, differentiation, development and function of the tissues and organs, in order to understand how the complexity of the molecular interactions determines the phenotype of organisms alive, with a special emphasis on the human organism.

- CE22. Know how to work properly in a biochemical laboratory with biological and chemical material, including safety, handling, disposal of biological and chemical waste, and record of activities.
- CE23. Know how to apply experimental laboratory protocols in the area of Biochemistry and Molecular Biology.
- CE24. To possess the mathematical, statistical and computer skills to obtain, analyze and interpret data, and to understand simple models of biological systems and processes at the cellular and molecular level.
- CE25. Know how to find, obtain and interpret information from the main biological databases (genomic, transcriptomic, proteomic, metabolomic and similar derived from other mass analyzes) and bibliographic data, and use the basic bioinformatic tools.
- CE26. To be able to pose and solve questions and problems in the field of Biochemistry and Molecular Biology through scientific hypotheses that can be examined empirically.
- CE28. Ability to transmit information within the area of Biochemistry and Molecular Biology, including the preparation, writing and oral presentation of a scientific report.
- CE29. Acquire basic training for the development of projects, including the ability to conduct a study in the area of Biochemistry and Molecular Biology, to critically interpret the results obtained and to evaluate the conclusions reached.

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

- To recognize the participation of different physiological systems in that operation.
- To provide the knowledge necessary to (i) understand the basic principles that determine the functioning of the body, (ii) to acquire the methodology for the study of the operation. In this course knowledge of Anatomy, Histology and Biochemistry is integrated. Basic knowledge of English is recommended.
- To train the student in management tools and techniques commonly used in a laboratory, especially those that allow explore body functions, and interpretation of the information they provide.

DETAILED SUBJECT TOPICS

THEORETICAL UNITS

Unit 1. General and cell physiology.
Unit 2. Molecular Physiology of epithelial tissues.
Unit 3. Molecular physiology of oxidative stress.
Unit 4. Molecular physiology of the regulation of intracellular calcium concentration.
Unit 5. Muscle physiology.
Unit 6. Neuronal physiology.
Unit 7. Respiratory function.
Unit 8. Renal function.
Unit 9. Physiology of the cardiovascular system.
Unit 10. Physiology of blood.
Unit 11. Physiology of the nervous system.
Unit 12. Physiology of the senses.
Unit 13. Physiology of the digestive system.
Unit 14. Introduction to endocrine physiology.
Unit 15. Introduction to the physiology of sex determination and differentiation.
Unit 16. Integration and adaptation of the organism.
Unit 17. Introduction to physiology and biomedical engineering relationship.
Unit 18. Introduction to Physiome.
# PRACTICAL SESSIONS

## Seminars / Workshops

Exhibition in class, proposed at the beginning of the course by the teacher, related theoretical syllabus, but not included in the same work, the focus should be aimed at biomedical applications.

## Academic tutorials

- Regular meetings will be held in specific tutoring, in which it is intended to resolve questions raised by the students.

## Laboratory Practice

1. **Practice 1.** Cell permeability and transport mechanisms (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012).
3. **Practice 3.** Nutritional and body composition evaluation: study of endocrine, metabolic and biochemical effects (AyS Program BitASDE, SA; Database: BEDCA, 2015).
4. **Practice 4.** Mechanical cardiovascular practice in response to the administration of varying concentrations of different drugs (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012).

# SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND KNOWLEDGE

## EVALUATION

### Ordinary evaluation:

The evaluation of the student will be made from the presentations and / or expositions of the works and the exams in which the student will have to demonstrate the acquired competences. The final grade (0-10 points) will be the result of the evaluation of the different parts of the subject. Thus, the theoretical part will represent 60% (6 points), the practical part 25% (2.5 points), the completion and exposure of jobs 15% (1.5 points).

- Evaluation of theoretical contents: through the accomplishment of 2 partial exams. Competencies will be evaluated CE09, CE11, CE12, CT4, CT6.

- Evaluation of seminars: through the realization and presentation of the same, valuing the knowledge, clarity in the presentation, capacity of communication, bibliography used, etc. Competencies CE25, CE26, CE28, CT2, CT7, CT9.

- Evaluation of laboratory practices: with the accomplishment of a written examination to evaluate the contents and the valuation of the knowledge, by the supervision of results obtained in each practice. Competences will be evaluated CE9, CE22, CE23, CE24, CE26, CT6, CT7.

### Extraordinary assessment:

Students who do not pass the subject per course can be evaluated through an extraordinary examination of all the contents, which will include:

- a) Theoretical contents: Written examination of the complete theoretical agenda, with which the acquired theoretical knowledge will be valued.
- b) Practical contents: Written exam corresponding to the 4 practices carried out, which will assess the knowledge acquired.

# DESCRIPTION OF THE TESTS THAT WILL BE PART OF THE FINAL SINGLE EVALUATION ESTABLISHED IN THE "RULES OF EVALUATION AND QUALIFICATION OF STUDENTS OF THE UNIVERSITY OF GRANADA"
According to the Evaluation and Qualification Regulations of Students of the University of Granada (modified in Governing Council on October 26, 2016), the evaluation will preferably be continuous, understanding the diversified evaluation established in the Teaching Guides of the subjects. Nevertheless, the Teaching Guides will contemplate the realization of a single final evaluation that will be able to benefit those students who can not comply with the method of continuous evaluation for reasons of work, health status, disability or any other duly justified cause that prevents them from following the continuous assessment regime "(article 6, 2). In accordance with article 8 of the aforementioned regulations: "In order to take advantage of the final final evaluation, the student will ask the Director of the Department, in the first two weeks of the course, to transfer to the corresponding faculty, claiming and accrediting the reasons that assist to him to not be able to follow the system of continuous evaluation ".

The application can be submitted electronically at the following link: https://sede.ugr.es/sede/catalogo-procedimientos/solicitud-evaluacion-una-final.html

BIBLIOGRAPHY

PRINT BOOKS ON PHYSIOLOGY

KEY REFERENCES:
• CONTI F. Medical Physiology. McGraw-Hill / Interamericana de Mexico, 2010
• MARTIN CUENCA E. Fundamentals of Physiology, Thomson, 2006
• SHERWOOD L., Klandorf YANCEY P. H. and Animal Physiology: From Genes to Organisms, Brooks Cole, 2012

FURTHER READING:
• BEAR M.F., CONNORS B.W. y PARADISO M.A. Neurociencia. La exploración del cerebro. Lippincott, Williams & Wilkins, 2008.
• KOEPPEN, B.M. Renal Physiology. Ed. MOSBY, 2012.
• KRONENBERG H.M., MELMED S., POLONSKY K.S. Y LARSEN P.R. Williams Tratado de Endocrinología, Elsevier, 2009
• MADRID J.A. y ROL DE LAMA A. (d.r.s) Cronobiologia, Editec@Red, 2006
• PURVES D., AUGUSTINE G.J. Neurociencia, Panamericana, 2008

RECOMMENDED INTERNET LINKS