# MOLECULAR ANIMAL PHYSIOLOGY

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<tr>
<th>MODULE</th>
<th>CONTENT</th>
<th>YEAR</th>
<th>TERM</th>
<th>CREDITS</th>
<th>TYPE</th>
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<tbody>
<tr>
<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)
Mr. Jeronimo Aragon Vela (P *)

(T *: Theory; P *: Practice)

**Postal address, telephone no, e-mail address**

Department of Physiology, School of Pharmacy, University of Granada. Phone number: +34 958 243879

**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

Mr. Aragon Vela (jeroav@ugr.es):
Wednesday: 9-10.30h, in the office of the Department of Physiology, Faculty of Pharmacy

**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 field of study) to inform judgments that include reflection on relevant social, scientific or ethical.

CB5 - That students have developed those skills needed to undertake further studies with a high degree of autonomy.

**GENERAL SKILLS:**

CG3 - Acquire the ability to gather and interpret relevant data within the area of Biochemistry and Molecular Biology, and to draw conclusions and critically reflect on them in different relevant topics in the field of Molecular biosciences.

CG5 - have developed the skills needed to undertake further studies specialization with a high degree of autonomy, including the ability to assimilate the various scientific and technological innovations that are occurring in the field of Molecular Biosciences.

**TRANSVERSAL COMPETENCES:**
CT2. Able to work collaboratively in teams and shared responsibility.
CT3. Having an ethical commitment and concern for professional ethics.
CT4. Learning ability and self-employment.
CT6. Know how to recognize and analyze a problem, identifying its essential components, and plan a scientific strategy to solve it.
CT7. Knowing how to use basic tools for communication, information search and data processing in their professional activity.
CT9. Knowing how to communicate scientific information clearly and effectively, including the ability to present a paper, orally and in writing, to a professional audience, and to understand the language and proposals of other specialists.

SPECIFIC SKILLS:

CE9. Understand the main physiological processes of multicellular organisms, with special emphasis on the human species, as well as understanding the molecular basis of these physiological processes.
CE11. Have an integrated view of cellular functioning (including metabolism and gene expression), covering its regulation and the relationship between different cellular compartments.
CE12. An integrated view of intercellular communication systems and intracellular signaling that regulate the proliferation, differentiation, development and function of tissues and organs in order to understand how the complexity of the molecular interactions determines the phenotype of living organisms with a special emphasis on the human organism.
CE22. Able to work properly in a biochemical laboratory with biological and chemical material, including safety, handling, disposal of biological and chemical waste, and recorded activity log.
CE23. Able to apply experimental laboratory protocols in the area of Biochemistry and Molecular Biology.
Possessing CE24. Math skills, statistics and computer technologies to collect, analyze and interpret data, and to understand simple models of biological systems and cellular and molecular level processes.
CE25. Knowing how to find, obtain and interpret information from the main biological databases (genomic, transcriptomic, proteomic, metabolomic and similar derivatives of other mass analysis) and bibliographic data, and use the basic bioinformatics tools.
CE26. Ability to raise and resolve issues and problems in the field of biochemistry and molecular biology through scientific hypotheses that can be examined empirically.
CE28. Capacity 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 project development, including the ability to conduct a study in the area of Biochemistry and Molecular Biology, critically interpret the results and assess 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

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<th>Seminars / Workshops</th>
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<td>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.</td>
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<th>Academic tutorials</th>
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<td>- Regular meetings will be held in specific tutoring, in which it is intended to resolve questions raised by the students.</td>
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<th>Laboratory Practice</th>
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<tr>
<td><strong>Practice 1.</strong> Cell permeability and transport mechanisms (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012).</td>
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<td><strong>Practice 2.</strong> Muscle stimulation and fatigue (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012). Prepared neuro-muscular (Laboratory).</td>
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<td><strong>Practice 3.</strong> Nutritional and body composition evaluation: study of endocrine, metabolic and biochemical effects (AyS Program BitASDE, SA; Database: BEDCA, 2015).</td>
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<td><strong>Practice 4.</strong> Mechanical cardiovascular practice in response to the administration of varying concentrations of different drugs (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012).</td>
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###SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND KNOWLEDGE

####EVALUATION

**a) Ordinary evaluation:**

Student assessment will be made from the presentations and / or exhibitions of work and examinations in which the student must demonstrate the skills acquired. The final score (0-10 points) will be the result of the evaluation of the different parts of the subject. Thus, the theoretical part will account for 50% (5 points), the practical part 25% (2.5 points), realization and exhibition of work 15% (1.5 points) and assisting the remaining 10% (1 point).

- Evaluation of the theoretical contents: by performing 2 midterms. The skills CE09, CE11, CE12, CT4, CT6 will be evaluated.

- Evaluation of seminars: through the making and exposing them, valuing the knowledge, clarity of presentation, communication skills, bibliography used, etc. the CE25, CE26, CE28, CT2, CT7, CT9 competencies will be evaluated.
Evaluation of laboratory practice: with the completion of a written examination to assess the content and assessment of knowledge, by monitoring results of each practice. The EC 9, CE22, CE23, CE24, CE26, CT6, CT7 competencies will be assessed.

b) Extraordinary assessment:

Students who fail the course by course, may be evaluated by a special examination of all content, including:

1) Theoretical contents: Written exam complete theoretical program, with which the acquired theoretical knowledge will be valued.
2) Practical Contents: Written exam corresponding to the four studied practices in the acquired skills are valued.

c) Single Final Assessment

According to the Students Assessment and Qualification Policy of the University of Granada (adopted by the Governing Council on May 20, 2013), those students who cannot follow the continuous assessment system due to working, health or disability issues (or any other reason appropriately justified) can apply for a Single Final Assessment.

For this purpose, the student will submit a formal request to the Director (Head) of the Department, arguing and proving (with documented evidence) the reason for not being able to follow the continuous system. The submission deadline will be 2 weeks after the beginning of the lectures. In extraordinary circumstances, the starting date for counting the 2-week period will be the enrolment date (policy NCG78/9) and, in this case, the student will have to include the proof of enrolment date when making the request. After ten days without the student receiving a written reply from the Director of the Department, it will be understood that the request has been dismissed. In case of denial, the student may file, within one month, an appeal to the Rector, who may delegate this task to the Dean or Director of the Centre, exhausting the administrative proceedings.
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:
- 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. (drs.) Cronobiología, Editec@Red, 2006

RECOMMENDED INTERNET LINKS

http://www.ugr.es/local/fisioaai