### MOLECULAR ANIMAL PHYSIOLOGY

#### MODULE CONTENT

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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>
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#### LECTURER(S)

- Dr. María Alba Martínez Burgos (T *; P *)
  (Coordinator for the subject)
- Dr. Alfonso Varela López (P *)
  (T *: Theory; P *: Practice)

- Postal address, telephone n°, e-mail address

#### DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT

Degree in Biochemistry

#### 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 (ACCORDING TO THE DEGREE GUIDE)

- 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

• 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.
### 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. Nervous system I. Neuronal Physiology.
Unit 7. Nervous system II
Unit 8. Sensorial Physiology.
Unit 10. Physiology of the cardiovascular system.
Unit 11. Renal function.
Unit 12. Respiratory function.
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**

**Practice 1.** Cell permeability and transport mechanisms (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012).

**Practice 2.** Muscle stimulation and fatigue (TM PhysioEx 9.0. Simulations Laboratory of Physiology, 2012). Prepared neuromuscular (Laboratory).


**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).
READING

PRINT BOOKS ON PHYSIOLOGY

KEY REFERENCES:

FURTHER READING:
BEAR M.F., CONNORS B.W. y PARADISO M.A. Neurociencia. La exploración del cerebro. Lippincott, Williams & Wilkins, 2008.
MADRID J.A. y ROL DE LAMA A. (drs.) Cronobiología, Editec@Red, 2006.

RECOMMENDED INTERNET LINKS
- http://medicapanamericana.com/fisiologia
- http://www.vivo.colostate.edu/hbooks/pathphys/endocrine/basics/overview.html
- http://www.vivo.colostate.edu/hbooks/pathphys/endocrine/gi/overview.html
- http://muscle.ucsd.edu/musintro/jump.shtml
- http://nephron.com
- http://www.tiroides.net
- http://www.physiome.org
- http://www.the-aps.org
EVALUATION (EVALUATION INSTRUMENTS, EVALUATION CRITERIA AND PERCENTAGE ON THE FINAL QUALIFICATION, ETC.)

• Continuous assessment, ordinary call:
The evaluation of the student will be made from the presentations and / or exhibitions of the works and 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 realization and exhibition of works 12.5% (1.25 points), and attendance to class 2.5% (0.25 points).

Evaluation of the theoretical contents: through the realization of 2 partial exams. The competences CE09, CE11, CE12, CT4, CT6 will be evaluated.

Evaluation of seminars: through the realization and exhibition of them, valuing the knowledge, clarity in the presentation, communication capacity, bibliography used, etc. The competences CE25, CE26, CE28, CT2, CT7, CT9 will be evaluated.

Evaluation of laboratory practices: with the performance of a written examination to evaluate the contents and the evaluation of the knowledge, by supervising the results obtained in each practice. The competences CE9, CE22, CE23, CE24, CE26, CT6, CT7 will be evaluated.

• Continuous assessment, extraordinary call:
Students who do not pass the subject per course, may be evaluated by an extraordinary examination of all contents, which may include:

a) Theoretical contents: Written exam of the complete theoretical agenda, with which the theoretical knowledge acquired will be valued.

b) Practical contents: Written exam corresponding to the 4 practices studied, with which the acquired practical knowledge will be valued.

Once the theoretical and practical contents are passed, the marks obtained in the other components of the continuous evaluation of the subject will be taken into account, both in the ordinary and extraordinary call, and always following the indications of the paragraph included in the Additional Information section of this Guide (see below).


According to the Regulations for the Evaluation and Qualification of Students of the University of Granada (approved in ordinary session of the Governing Council on October 26, 2016), it is contemplated that a single final evaluation will be carried out to which students who can take advantage of they can not comply with the continuous assessment method for work reasons, health status, disability or any other duly justified cause that
prevents them from following the continuous evaluation regime. To qualify for the final single evaluation, the student will ask the Director of the Department (who will transfer to the corresponding faculty), stating and stating the reasons for not being able to follow the continuous assessment system. The application period will be 2 weeks from the beginning of the delivery of the subject. If there are exceptional circumstances, the calculation of the deadline will be made from the date of registration (regulation NCG78 / 9), in which case, the student must prove this last date when the request is submitted. After ten days without the student having received an express and written response from the Department Director, the request will be considered estimated. In case of refusal, the student may file, within one month, appeal to the Rector, who may delegate to the Dean or Director of the Center, exhausting the administrative procedure.

The final evaluation will consist of two exams, which will be held on the same day:

- Examination of the theoretical contents: 75% of the grade.
- Examination of practical contents: 25% of the grade.

### ADDITIONAL INFORMATION

In order to pass the subject, it will be an indispensable requisite, both in the Continuous and in the Single Final Assessment systems, to have a minimum score of 5 points out of 10 in the theory as well as in the laboratory practice parts. In no case the marks obtained in other components of the Continuous Assessment system (coursework and presentations, assistance to theoretical classes, or any other evaluable component that may be mentioned in the Subject Guide), will serve to pass the subject and will only contribute to the final mark once the theoretical and practical parts have been passed.

The dates of exams will be displayed on the website of the Degree in Biochemistry (http://grados.ugr.es/bioquimica).