Universidad de Navarra

Writing Science (MInvB)

Teaching guide 2025-26

INTRODUCTION

Course description:

With the sequencing of the human genome, biological and biomedical science is entering a new era of scientific investigation. How can we place the immense data generated from the genome project into a functional context? Conversely, how can studies of whole organisms or living systems shed light on molecular and cellular biology? These questions are becoming a more pressing challenge as increasingly powerful and accessible technologies enable the rapid generation of genetically modified organisms for study. In this course we will study some of the molecular mechanisms that underlie organ function which will help to answer some of those questions and enable us to understand the causes of their dysfunction in different pathologies.

- Degree: BIOCHEMISTRY
- Module in the Degree Program: Module VI. Physiological Integration and Application of Biochemistry and Molecular Biology.
- Number of credits: 6 ECTS
- Year: Third, 2º semester
- Type of course: Required
- Instructors: Dr. D. Manuel López Sánchez
- Language: English
- Department: Nutrition, Food Science and Physiology (*Departamento de Ciencias de la Alimentación y Fisiología*). School of Pharmacy.
- Lecture schedule: Tuesday, Thursday and Friday from 5:00-6:00 pm

LEARNING OUTCOMES (COMPETENCIES)

- CE6. Understand, analyze, discuss, write and present scientific arguments in English as a reference language in the scientific sphere.
- CE7. Understand the importance and complexity of the regulation and integration of the diverse functions in the organism for their application in Biomedicine. Acquire skills in interpreting the molecular alterations causing human pathologies.
- CE2. Transmission of knowledge. Develop skills in oral communication on Molecular Biomedicine. Know how to express oneself clearly in conversations and debates in the correct style and language. Speak in public accompanying the oral message with the adequate non-verbal resources (position, gesture) in diverse situations. Know how to listen.

PROGRAM

1. Introduction. What is molecular physiology? Integrated understanding of body function at the cellular and molecular level. Overview of the mechanisms of cellular communication and signal transduction.

2. Transport of solutes across the cell membrane. Intracellular and extracellular fluids. Solute transport across cell membranes: Channels and transporters.

3. Water transport and regulation of cell volume. Transport of solutes and water across epithelia.

4. **Electrophysiology of cell membrane**. Ionic bases of membrane potential. Electrical model of a cell membrane.

5. **Electrical excitability and action potentials.** Molecular physiology of the voltage-gated channels. Conduction of the action potentials in neurons. Cardiac action potentials.

6. **Synaptic transmission and the neuromuscular junction**. Mechanisms of synaptic transmission: electrical synapses and chemical synapses. Synaptic transmission at the neuromuscular junction. Termination of neurotranmitter action.

7. **Molecular physiology of skeletal, cardiac and smooth muscle.** Function of the muscle: overview. Propagation of the action potential and excitation-contraction coupling in skeletal muscle, cardiac muscle and smooth muscle.

8. **Molecular physiology of sensory transduction.** Sensory receptors: overview. Chemical senses: taste receptors cells and taste transduction. Olfactory receptor cells and olfactory transduction. Photoreceptor cells and phototransduction. Auditory transduction.

9. **Cardiovascular function**: overview. Molecular mechanism of vasoconstriction by endothelin. Glial and neuronal control of brain blood flow.

10. **Respiratory function:** overview. Chemical control of breathing: oxygen and CO_2/pH sensing by the carotid bodies. Cystic fibrosis transmembrane conductance regulator (CFTR) in the respiratory epithelium

11. **Gastrointestinal function:** overview. Acid secretion by the parietal cells and its regulation. Stimulation of the protein secretion by the pancreatic acinar cells. Uptake, processing and secretion of compounds by hepatocytes.

12. **Renal function:** overview. Tubuloglomerular feedback regulation of glomerular filtration. Regulation of the extracellular fluid: sodium and water transport in the kidney.

13. **Endocrine system:** overview. Synthesis and release of T3 and T4 by the thyroid follicular cells. Action of Vitamin D in the small intestine and kidney. Control of energy balance and food intake. Hormone action in the mammary gland: lactation.

EDUCATIONAL ACTIVITIES

I. CLASSROOM TEACHING ACTIVITIES

1. Lectures

Lectures are given by the professor on the themes indicated in the syllabus with the help of the blackboard, power point presentations, videos and animation movies. The professor will post on ADI the power point presentation, the notes for each topic and some recommendations for futher reading.

2. Seminars (Required)

They include:

- Responses to students' questions by the professor and classmates.
- Presentation by the professor of current scientific issues related to the course.
- Oral presentations by the students on topics proposed by the professor. Class will be divided into groups of 5 students each. Each group will prepare an oral presentation in which each student will talk for 7-10 min. At the end of the presentation the students will have to answer questions.

3. One-to-one tutorials

Each student may have personal interviews with the professor to help him/her with personal study and learning.

4. Evaluation

Exams to assess the successful accomplishment of the objectives

II.PERSONAL WORK

Students must understand themes covered early in the course to be able to comprehend information presented later in the course, and will have to be able to integrate material learnt throughout the course. Therefore, it is important that they do not fall behind and try to set aside regular times outside of class to work on the course material on a daily basis.

1. Students must read the assigned reading for a subject before the lecture covering that topic. Being familiar with topics beforehand will allow students to get the most out of the lecture.
2. Students should conduct personal study using the professor's notes, notes taken in lectures and recommended books if needed.
3. Students have to prepare oral presentations in English.

Credits/hours distribution of the activities. 6 ECTS= 150 h (25 h/ECTS)

1. Lectures 1.6 ECTS 40 h (26.7 %)

2. Seminars 0.6 ECTS 15 h (10.0 %)

3. Evaluation 0.16 ECTS 4 h (2.6 %)

Total classroom activities 2.4 ECTS 59 h (40 %)

4. On-to-one tutorials 0.04 ECTS 1 h (0.7 %)

5. Personal work 3.6 ECTS 90 h (60 %)

Total 6 ECTS 150 h (110 %)

Theoretical classes (28h)

There will be 28h of theoretical classes where the students acquired the rudiments of the epigrapher being able to present, through editing systems, and contextualize, obtaining from it historical information, Roman inscriptions of content and basic difficulty. For these tasks, a space will be reserved in the final qualification of the subject space oriented to the most practical dimension -both editing and interpretation- of the work of the epigrapher.

The remote access (Zoom) to the classes is in the internal area, section "Remote access"

Before classes, students must do some readings and/or exercises. Questions that may arise from this activity will be resolved in class or through the subject forum. In the internal area of the subject, you can consult the details of the "Activities Plan" and access the subject's doubts forum.

Epigraphic excursion (5h)

There will be an epigraphic excursion during the semester of which the student must make a final report. If necessary, this activity could be replaced by a virtual visit to a museum. The day on which this activity is carried out will be communicated in advance. The memory will be delivered from the internal area of the subject.

Student's personal work

Personal study (32h)

Epigraphic excursion and realization of the Memory (5h)

Exam completion (2h)

Tutorials (non-contact)

TOTAL: 75h

ASSESSMENT

There will be 3 multiple choice test with clickers and a final exam. The final exam will also be multiple choice tests. Exams questions will be drawn directly from lectures, class discussions and seminars.

To calculate the final grade, course performance and grading will be determined as follows :

- Clicker tests: 30 %
- Final exam: 50 %
- Seminars: 20 %

Seminars will be graded taking into account the oral presentation (content and skills to communicate in English) and participation. Criteria for evaluation will be posted on ADI.

The final exam will be held on May 8. Students who would like to improve the final grade will have the option of responding to an essay question in the final exam. This question will be drawn from recommended readings and may increase the final mark up to 1 point.

Clicker test will be held at the begining of class and will include:

1. Test 1: Themes 1-4
2. Test 2: Themes 5-8
3. Test 3: Themes 9-12

Criteria to pass the course

- Students whose final grade is 5 points or more will pass the course.

- Students whose final grade is below 5 points will not pass the course and will be graded as *Suspenso* .
- Students who do not take the final exam will not pass the course and will be graded as *No presentado*.

Exams review

- Students will be able to review the exams in an interview with the professor, after publication of the grades, in a day and place that will be indicated.

Evaluation in the extraordinary call

- Final exam of theoretical knowledge (70%): multiple-choice questions.
- Final exam of applied knowledge (30%): questions related to clinical cases, practical application of concepts, problems, etc.

Special assessment

For those who do not pass the course in May or did not take the exam (grades *Suspenso* or *No presentado*) there will be an extraordinary multiple choice test exam in June which will account for 50% of the final grade.

Students with special educational needs

Students with special educational needs must contact the Academic Coordination Office of the (faculty/school) in advance to obtain the corresponding authorization for any adaptations (for example, extra time in exams). This authorization must then be sent by the student to the professor. It is recommended that this procedure be completed at the beginning of the semester.

OFFICE HOURS

Dr. Mario Rodriguez García (mail@unav.es)

- Despacho 2356. Edificio de Investigación. Planta 1
- Horario: miércoles de 13.00 a 14.00
- Concertar cita previamente por mail

Dr. Roberto Segura López (mail@unav.es)

- Despacho 2336. Edificio de Investigación. Planta 0
- Horario: jueves de 17.00 a 18.30h
- Concertar cita previamente por mail

BIBLIOGRAPHY AND RESOURCES

Find the books in the Library

Textbook:

- Boron, W.F. and Boulpaep E.L.: “Medical Physiology. A cellular and molecular approach”. Saunders-Elsevier. Philadelphia, 2009.

Other

- Fox, S.I.: “Human Physiology", 10th Edition. McGraw-Hill, New York, 2010.

- Sherwood, L.: "Human Physiology: From cells to system", Brooks/Cole, USA, 2010.

- Review Articles from the Scientific journal "Physiology"http://physiologyonline.physiology.org/ (Free access from the University intranet)

- For translation and pronunciation of words and short sentences:

http://translate.google.com/#en|es|