Medical Physiology II

Academic Year: (2024 / 2025) **Review date: 03-12-2024**

Department assigned to the subject: Bioengineering Department

Coordinating teacher: SALINAS RODRIGUEZ, BEATRIZ

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

It is preferable, although not required, to have completed:

- Cell and molecular biology
- Biochemistry
- Biological systems

LEARNING OUTCOMES

RA1: Acquire knowledge and understanding of the basic general fundamentals of engineering and biomedical sciences.
RA4: Be able to use appropriate methods to carry out studies and solve problems in the biomedical field, commensurate with their level of knowledge. Research involves conducting literature searches, designing and carrying out experimental practices, interpreting data, selecting the best approach and communicating knowledge, ideas and solutions within their field of study. May require consultation of databases, safety standards and procedures.
CB1: Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2: Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3: Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB4: Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
CG1: Adequate knowledge and skills to analyse and synthesise basic problems related to engineering and biomedical sciences, solve them and communicate them efficiently.
CG2: Ability to design, draft and develop scientific-technical projects in the field of biomedical engineering.
CG3: Knowledge of basic scientific and technical subjects that enables them to learn new methods and technologies, as well as providing them with great versatility to adapt to new situations.
CG4: Ability to solve problems with initiative, decision-making, creativity, and to communicate and transmit knowledge, skills and abilities, understanding the ethical, social and professional responsibility of the biomedical engineer's activity. Capacity for leadership, innovation and entrepreneurial spirit.
CG5: Adequate knowledge of the field of work of the biomedical engineer in companies, health or biomedical research centres.
CG7: Drafting, representing and interpreting scientific-technical documentation.
CG8: Ability to solve mathematical, physical, chemical and biochemical problems that may arise in biomedical engineering.
CG13: Knowledge of the fundamental principles of molecular, cellular, structural and biochemical biology applied to human beings.
CG14: Acquire a global vision of the basic functioning of biological systems. Ability to model such systems using mathematical and computational tools.
CG18: Ability to apply knowledge of human anatomy and physiology to the resolution of problems in

medicine from the point of view of bioengineering. Ability to identify medical problems that can be treated by means of techniques encompassed in Biomedical Engineering.
CG21: Ability to analyse complex and multidisciplinary problems from the global point of view of Biomedical Instrumentation.
ECRT29: Acquire the knowledge of human anatomy and physiology necessary to be able to interact in interdisciplinary environments, to understand the basis for the use of diagnostic and therapeutic medical technologies, and to be able to approach the solution of problems in biomedicine from the engineering point of view.
CT1: Ability to communicate knowledge orally and in writing to both specialised and non-specialised audiences.

OBJECTIVES

The subjects Medical Physioloy I and Medical Physioloy II are mainly focused in providing a sound background on human Anatomy and Physiology. It will also cover some aspects of Pathology and Patophysiology, diagnostic andtherapeutic procedures and medical terminology.

Whenever possible, the different topics will be explained trying to address an engineer's perspective and interests rather than providing a conventional medical or biological viewpoint. After this fascinating course, the student will certainly acquire the necessary knowledge to understand the key role of engineering in advances in physiology-based patient monitoring and treatment.

The practical sessions will facilitate a better understanding of the bases of physiology and a closer contact with the real world, using instrumentation and devices available at the University and at the Hospital Universitario de Getafe. Hospital Visits with experts in the different fields are planned in key hospital services deeply dependent on technology and engineering.

Among the skills the students are expected to acquire we can mention:

- Basic knowledge of human anatomy and anatomical terminology.
- Intermediate-level knowledge of human physiology, with particular emphasis on quantitative descriptions of physiological models, whenever appropriate.
- Familiarity with some basic medical procedures.
- Understanding of the (past and ongoing) key role of engineering in the advancement of medical physiology.
- Ability to communicate with physicians, understanding their jargon and needs, and being able to read clinical documents.

DESCRIPTION OF CONTENTS: PROGRAMME

The program for the subjects Medical Physiology II include the following modules:

- Digestive system
- Respiratory system
- Urinary systems
- Regulation of metabolism
- Defence mechanisms

LEARNING ACTIVITIES AND METHODOLOGY

Each section of the programme will be divided into lectures and practical sessions/seminars/hospital visits.

Some practical sessions will take place at the Laboratories at the UC3M; some others will require visits to Hospital Universitario de Getafe (lab coat mandatory in both sites).

ASSESSMENT SYSTEM

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

Grading
Final grade is calculated based on the final exam and the continuous evaluation marks:

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

- Final exam: 60%
- Continuous evaluation 40%

Continuous evaluation consists of short (or midterm) exams, lab practical sessions and hospital visits. These elements will be averaged (60% short exams, 40% lab practical sessions and hospital visits) and be part (40%) of the final grade.
To average the final grade, the score in the final exam AND the continuos evaluation (40% hospital visits and lab sessions; 60% partial exams) should be ¿4.5 out of 10, i.e., both the final exam and the continuous evaluation have to be passed.
The subject coordinator, in agreement with the other teachers of the subject, could, in cases of especial merit, based on participation, attitude (shown, for example, by questions asked and answered), or kahoot quizzes success, add 10% to the final grade to students that have shown especial motivation and commitment.

Extraordinary exam
The mark for students attending any extraordinary examination will be one of the following:
a) 100% exam
b) 60% exam and 40% continuous evaluation if it is available in the same course
The student will be asked to indicate her/his preference (either "a" or "b") before the exam starts.

Academic conduct
Unless otherwise specified, all exams will be closed-book, closed-notes, no PC or mobile phone. Plagiarism, cheating or other acts of academic dishonesty will not be tolerated. Any infractions what so ever will result in a FAILING GRADE.

BASIC BIBLIOGRAPHY

- Guyton & Hall Textbook of medical physiology, Saunders Elsevier, 2011

- Linda S. Costanzo Physiology. Cases and problems, Lippincot Williams & Wilkins, 2012

- Tortora & Derrickson Principles of Human Anatomy and Physiology, WILEY, 2009

- Walter F. Boron Medical Physiology, Elsevier 2016, 2016