Biological Systems

Academic Year: (2019 / 2020) **Review date: 07-05-2020**

Department assigned to the subject: Bioengineering and Aeroespace Engineering Department

Coordinating teacher: JORCANO NOVAL, JOSE LUIS

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

It is strongly advised to have completed Mathematics, Programming, Physics, Fundamentals of Biology and Biochemistry.

OBJECTIVES

The main goal of the course is to acquire capabilities for modeling common biological systems using mathematical physical and computational tools. The student will be able to apply these tools for extracting quantitative information in order to understand different type of systems. Finally the student will acquire capabilities for evaluating and be objective with the results obtained from those analyses and models.

DESCRIPTION OF CONTENTS: PROGRAMME

Biological Systems: The course consists of (1) statistical representation for analyzing, interpreting and predicting biological data,(2) modeling description and application related to biological components involved in cellular processes, and (3) modeling trees and biological networks at molecular level. Students will learn from the point of view of quantitative modeling of biological systems: study of data related to biological systems, description and modeling of the structure and dynamics of biological components, study of interactions between the molecular systems involved in biological processes, study of genetic networks, molecular and biochemical interactions.

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology will include:

- Lectures, where the concepts that students must acquire will be shown. To facilitate its development students receive class notes and have basic reference texts that will facilitate following the lessons and developing further work. These classes are designed by way of seminars.
- Resolution of exercises, problems and laboratory practice to serve as self-assessment to acquire the necessary skills to perform the works corresponding to the continuous assessment, experimentally verifying the results presented in class.

ASSESSMENT SYSTEM

The evaluation system includes continuous assessment of student work (papers, class participation and tests assessing practical skills and theoretical knowledge), and final evaluation through a final written exam that will assess knowledge globally the skills and abilities acquired throughout the course. Continuous assessment will consist of three works corresponding to three main blocks taught in the course, totaling 50% of grade divided into three evaluations of 16.6% each. The other 50% of the mark will be obtained through a written exam. It is necessary to obtain a mark higher than 4 over 10 in this exam to add to this mark the continuous evaluation mark.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- Allman, Elizabeth Spencer Mathematical models in biology : an introduction , Cambridge University Press, 2004

- Helms, Volkhard Principles of computational cell biology : from protein complexes to cellular networks, Wiley-VCH,, 2008
- Shonkwiler, Ronald W Mathematical biology : an introduction with Maple and Matlab , Springer, 2009