Biophysics 2: Systems and synthetic biology. Computational biology

Academic Year: (2022 / 2023)

Review date: 20/06/2022 10:07:22

Department assigned to the subject: Bioengineering Department Coordinating teacher: LEON CANSECO, CARLOS Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

It is recomended to have completed satisfactorily Biophysics 1: Molecular, celular and tissular physics biology, Biología física molecular, celular y tisular

DESCRIPTION OF CONTENTS: PROGRAMME

- 1. Introduction to "omic" technologies
- 2. Omic integration and biomedical applications

3. Introduction to biological networks and Systems Biology. Analysis of collective properties in systems of interacting components

- 4. Gene regulatory and protein-protein interaction networks
- 5 Metabolic networks and disease networks
- 6. Introduction to Neurosciences: Modeling the brain and the nervous system
- 7. Introduction to Synthetic Biology. Synthetic Biology circuits
- 8. Modeling biological systems. Logic circuits.
- 9. Metabolic engineering. Minimal cells.
- 10. Biomedical applications of Synthetic Biology

LEARNING ACTIVITIES AND METHODOLOGY

AF1. THEORETICAL-PRACTICAL CLASSES. Knowledge and concepts students mustacquire. Receive course notes and will have basic reference texts. Students partake in exercises to resolve practical problems

AF2. TUTORING SESSIONS. Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher. Subjects with 6 credits have 4 hours of tutoring/ 100% on- site attendance.

AF3. STUDENT INDIVIDUAL WORK OR GROUP WORK.Subjects with 6 credits have 98 hours/0% on-site. AF8. WORKSHOPS AND LABORATORY SESSIONS. Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.

AF9. FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course. It entails 4 hours/100% on-site

AF8. WORKSHOPS AND LABORATORY SESSIONS. Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.

MD1. THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject's main concepts are developed, while providing material and bibliography to complement student learning MD2. PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group

MD3. TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with teacher as tutor. Subjects with 6 credits have 4 hours of tutoring/100% on-site. MD6. LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

% end-of-term-examination/test:

% of continuous assessment (assigments, laboratory, practicals...):

SE1. FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course. The percentage of the evaluation varies for each subject between 60% and 0%.

SE2. CONTINUOUS EVALUATION. Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course. The percentage of the evaluation varies for each subject between 40% and 100% of the final grade.

Specifically, in this course, the continuous evaluation is 50%, and consists of the presentation of a work project (25%), the delivery and presentation of a critical commentary of a scientific article (15%), and the completion of small exercises during practical classes (10%).

BASIC BIBLIOGRAPHY

- Natalie Kuldell PhD., Rachel Bernstein, Karen Ingram, Kathryn M Hart Synthetic Biology in the Lab, BioBuilder, 2015

- Uri Alon An Introduction to Systems Biology: Design Principles of Biological Circuits, Chapman & Hall/CRC Mathematical and Computational Biology, 2006