Teaching guide

IDENTIFICATION DETAILS

Degree:	Biomedicine
Scope	Biology and Genetics
Faculty/School:	Experimental Sciences
Course:	BASIC BIOINFORMATICS
Type:	Compulsory
ECTS credits:	4,50
Year:	2
Code:	2143
Teaching period:	Third semester
Subject:	Biomedical Research Tools
Module:	Experimental Methodology in Biomedicine
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	112,50

SUBJECT DESCRIPTION

Current biomedical research technologies are capable of generating large flows of quantitative and qualitative information. The enormous volume of all these data makes it impossible in practice to manage them without the help of information technologies, which allow access via the Internet and the development of automatic processing methods. Due to the existing diversity of experimental techniques, the set of all these data is also extremely heterogeneous. And to add more complexity to this summarized picture, most of these methods are not limited to giving a numerical or visual interpretation of the experimental data. On the contrary, and thanks to the incorporation of statistical and biophysical techniques and models, they are predictive in nature.

Although it has a controversial formal definition, bioinformatics can easily be understood as the scientific discipline that deals with the ordering, classification, analysis and prediction of biological data. With the course of Basic

Bioinformatics, the student is introduced to this complex scientific field. However, the number, variety and complexity of bioinformatics methods and resources that exist today is enormous. In addition, as is the case in all scientific fields, they are in a continuous process of review, improvement and innovation. For this reason, the general approach of the course emphasizes the idea of (1) obtaining an overview of them, while (2) acquiring basic competencies in the most established fields of bioinformatics. Every future biomedical person must acquire the knowledge and skills that allow them to analyze and interpret the wide spectrum of data that the current technological reality brings to their research. As an introductory subject, the student will take multidisciplinary contact with basic techniques for managing and processing very different experimental data, such as those coming from structural biology, pharmacology, genomics or systems biology. You will also get in touch with some basic predictive methods that allow you to generate scientific knowledge on their own.

In a complementary way, the course promotes the essential nature of computational methods in the current design of experiments and in the translational processes of biomedical research projects.

GOAL

The final objective of the Basic Bioinformatics course is to acquire fundamental skills to understand, manage and interpret heterogeneous bioinformatic resources and predictive models derived from them on the function of genes, proteins and other biomolecules.

The specific aims of the subject are:

Acquire solid methodological foundations for obtaining, processing, analyzing, visualizing and interpreting sequence and structure information of proteins, nucleic acids and other biomolecules.

Provide students with a solid methodological base to start in advanced bioinformatics disciplines such as (i) function prediction and annotation in biology, (ii) the prediction and analysis of macromolecular interactions at the structural level, (iii) computational modeling of new therapeutic targets.

PRIOR KNOWLEDGE

It is highly recommended that the student has passed the subjects of Basic Biostatistics, Biochemistry, Genetics and General and Organic Chemistry. It is recommended that the student be able to manage web and office applications (management of files, documents, databases and spreadsheets).

COURSE SYLLABUS

BLOCK I. Introduction to scientific informatics
Topic 1. Introduction to Bioinformatics
Theme 2. Scientific publications and bibliography
Theme 3. Most Important Databases (NCBI)
BLOCK II: Sequence Analysis
Topic 4. Comparison of Nucleotide and Amino Acid Sequences
Topic 5. Multiple Alignments

Theme 6. Phylogenetic Trees

EDUCATION ACTIVITIES

The teaching+learning methodology in the subject of Basic Bioinformatics will be carried out through the following mandatory training activities (AF):
AF1. Participatory expository class sessions.
AF2. Participatory practical class sessions.
AF3. Carrying out practical work.
AF4. Attendance at seminars.
AF5. Tutorials

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
45 Horas	67,50 Horas

LEARNING RESULTS

Know and understand the applicability of multidisciplinary techniques that include concepts of nucleic acid and protein chemistry, sequencing and analysis of these biomolecules included in the area of bioinformatics.

SPECIFIC LEARNING RESULTS

It understands and manages the main current databases for biomedical research.

Understands and manages basic bioinformatics methods for carrying out sequence/structure/function analyses of biomolecules.

Correctly apply the methodologies used in computational research projects to solve problems in the field of biomedical research.

Analyze and correctly interpret original scientific articles related to the theoretical and practical contents of the subject.

LEARNING APPRAISAL SYSTEM

The evaluation of the subject seeks to assess the acquisition and degree of development of all the competencies provided for in this teaching guide by students. R1-R4 learning outcomes will be evaluated.

MINIMUM REQUIREMENTS TO PASS THE COURSE ----------

In any call, evaluation system, the subject is passed by obtaining a minimum score of 5 in each and every one of the 'CAL' grades broken down into the following sections of this Teaching Guide.

EVALUATION SYSTEMS----------

1) ORDINARY: Based on continuous evaluation. The final grade will consist of the following grades, according to the indicated percentages:

- CAL1 (60%): continuous evaluation of the theoretical, practical and methodological contents covered in the course. It will consist of test-type, short-answer and/or development questions.
- CAL2 (30%): carrying out and evaluating experimental work, individually or in groups (25%). Evaluation of work at seminars and/or exhibitions (5%).
- CAL3 (10%): carrying out and solving exercises and practices developed during the course. Extraordinary calls.

In the event of not having passed CAL1, a single written exam must be carried out on the same contents evaluated in the ordinary call. In the event of not passing CAL2 and/or CAL3, the student must submit the exercises, papers and suspended activities carried out during the semester of the current academic year (including seminars). As a general rule, the qualifications of the different parties approved in the ordinary call will be preserved.

2) ALTERNATIVE (option only for repeat students)

Not based on continuous evaluation. The teaching-learning process will be monitored through tutoring, which may be mandatory. 'This system is intended for repeat students who do not take advantage of the ordinary evaluation system because they cannot attend classes on a regular basis. Students in second or subsequent enrollment must contact the teacher at the beginning of the course to request to take advantage of this system." The final grade will consist of the following grades, according to the indicated percentages:

- CAL1 (60%): continuous evaluation of the theoretical, practical and methodological contents covered in the course. It will consist of test-type, short-answer and/or development questions.
- CAL2 (30%): carrying out and evaluating experimental work, individually or in groups (25%). Evaluation of work in seminars and/or exhibitions (5%).
- CAL3 (10%): carrying out and solving exercises and practices developed during the course. Extraordinary calls.

In the event of not having passed CAL1, a single written exam must be carried out on the same contents evaluated in the ordinary call. In the event of not passing CAL2 and/or CAL3, the student must submit the exercises, papers and suspended activities carried out during the semester of the current academic year (including seminars). As a general rule, the qualifications of the different parties approved in the ordinary call will be preserved.

EXAMS AND PARTIAL TESTS ----------

There is the possibility of proposing partial non-liberatory tests. The criteria for including these grades in the final grade of the subject will be communicated sufficiently in advance to all enrolled students, through publication in the virtual classroom system of the subject.

SECOND AND SUBSEQUENT ENROLLMENTS (repeat students) ----------

Repeat students who are unable to attend classes on a regular basis have the option of taking advantage of the Alternative Assessment System. To request to be evaluated using this system, they must necessarily contact the teacher at the beginning of the course. If this is not done, it is assumed that the student accepts the Ordinary Evaluation System. (See 'Alternative Assessment System'). As a general rule, CAL1, CAL2 and CAL3 scores are not retained between academic years.

DEADLINES FOR SUBMISSION OF PAPERS----------

The time allotted for the completion and delivery of works will be announced in the virtual classroom well in advance. Papers submitted after the deadline will be rated zero.
GENERAL CRITERIA FOR EVALUATING ACTIVITIES----------
"Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the University's Evaluation Regulations and Coexistence Regulations." In the qualification of exams and papers, the technical and scientific correctness of the student's original production, as well as their expressive capacity and language correction, will be assessed. This will take into account (1) the ownership of vocabulary and syntax, (2) the formal correction of schemes, tables and references, and (3) the appropriate general presentation. In the particular case of written works, the mere presentation of results copied from calculation programs or bioinformatics resources/services for public use on the Internet does not imply obtaining an approval. To approve these works, it will be essential for the student to contribute in an original way to the production subject to evaluation.
EXCEPTION: the incorrect use and/or spelling of acronyms specific to the subject matter covered in the subject may result in the classification of suspense in the affected party (s). Likewise, the incorrect use of scientific and technical terms may result in the classification of suspense in the affected party (s).

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Jonathan Pevsner. Bioinformatics and functional genomics/4th ed. Oxford: Wiley-Blackwell, 2015.

Claverie, Jean-Michel. Bioinformatics for dummies/2nd ed. Indianapolis:Wiley, 2007.
(Claverie, Jean-Michel. Bioinformatics for dummies/2nd ed. Indianapolis:Wiley, 2007. , ||Lesk, Arthur M. Introduction to Bioinformatics/4th ed. Oxford: Oxford University Press, 2014.)