

Bioinformatics

Code: 101000
 ECTS Credits: 6

Degree	Type	Year	Semester
2500502 Microbiology	FB	2	2

Contact

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Use of languages

Principal working language: catalan (cat)

Some groups entirely in English: No

Some groups entirely in Catalan: Yes

Some groups entirely in Spanish: No

Teachers

Daniel Yero Corona

Oscar Conchillo Solé

Prerequisites

In order to take this subject, it is recommendable that the students have previously acquired enough solid knowledge on subjects like Genetics, Microbiology, Molecular Biology and Biochemistry.

Objectives and Contextualisation

The treatment and computer analysis of molecular data has acquired a fundamental role in the modern Biology and the topics that will be taught in this subject are a basic introductory vision of bioinformatics. The main objectives are:

- To provide the basic bioinformatics knowledge that allows the use of search tools to interrogate the main public databases in Life Sciences and the different approaches for the computational analysis of nucleic acid and protein sequences.
- To give a perspective of the potential of this discipline in the field of research as well as in the professional field.

Content

Topic 1. Databases in Health and Life Sciences. Bibliographical databases. Search strategies. Exhaustive search. Automatic alerts. Bibliometric analysis. Molecular data bases. Search engines and strategies. Sequence formats. NCBI databases. Tools for DNA sequence analysis, visualization and edition.

Topic 2. Sequence Alignments. Pairwise sequence alignment tools. Local and global alignments. Substitution Matrices: identity and similarity. Scores, gaps and gap penalties. Sequence alignment and dynamic programming. Multiple sequence alignment. Progressive method of multiple alignments. Applications of multiple sequence alignment.

Topic 3. Sequence Similarity Search. Heuristic algorithms. Bioinformatics tools for sequence similarity searching in sequence databases: BLAST. Types of BLAST searches and their applications.

Topic 4. Proteins: Sequence Analysis. The sequence-structure-function relationship. Uniprot Database. Domain identification, profiles and HMM. Analysis and predictions of protein

Topic 5. Proteins: Structural Analysis. The protein data bank (PDB). Structural alignments. Homology modeling. Visualization and representation.

Topic 6. Task automation in bioinformatics. Introduction to the "script" and "pipeline" concepts

Topic 7. Genomics. Microbial genomes databases and genome browsers. Genome annotation and description tools. Comparative genomics. Genetic exchange detection. Metagenomics.

Topic 8. Molecular Phylogenetic Reconstruction. Molecular phylogenetic. Methods of phylogenetic inference. Phylogenetic reconstruction: Examples. Bioinformatics tools for molecular epidemiology.