

Advanced Genomics and Proteomics

Code: 43473
ECTS Credits: 9

Degree	Type	Year	Semester
4313794 Biochemistry, Molecular Biology and Biomedicine	OT	0	1

Contact

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Other comments on languages

approx 50% of the lectures

Use of languages

Principal working language: catalan (cat)

Teachers

Antoni Barbadilla Prados

Enric Querol Murillo

Alfredo Ruíz Panadero

Julia Lorenzo Rivera

Barbara Negre de Bofarull

Silvia Bronsoms Fabrellas

Sònia Casillas Viladerrams

Prerequisites

The Catalan, English or Spanish languages will be mostly used depending of the lecturer that will give a particular topic and the conjoint of attendees.

Addressed to post-graduate students in Biochemistry, Biotechnology, Biology, Biomedicine, Genetics, Microbiology, Chemistry, Informatics/Bioinformatics, Pharmacy, Medicine and Veterinary.

Objectives and Contextualisation

The overall aim of the subject is provide students with an overview of Genomics and Proteomics including fundamentals, current techniques and applications. The specific objectives of GENOMICS include understanding the following aspects. the diversity and complexity of eukaryotic genomes, the historical and evolutionary perspective of genomic content, the meaning and consequences of intraspecific variability, techniques commonly employed in studies of genomics and transcriptomics and applications derived from the knowledge provided by this science.

The aim of the PROTEOMICS lectures is provide students with an overview of the advanced methods of Proteomics and Interactomics (Proteogenomics annotation, MS Imaging...) and applications (biomarkers in biomedicine, differential proteomics for drug and vaccine target identification, network pharmacology and toxicology...). The first draft of the human Proteome and the Proteome Atlas will be introduced and discussed.

Content

GENOMICS: Introduction to Genomics. The human genome project. Genomic technologies. Transposable elements. Comparative genomics nucleotide-level changes. Comparative genomics: chromosomal changes. Population genomics: Theory. Population genomics in model species. Nucleotide variation in humans. Structural variation. Association Studies/System genetics. Functional Genomics and Transcriptomics. Epigenomics.

PROTEOMICS: Proteomics and proteogenomics. Proteogenomic annotation. How many proteins and proteoforms are in a mammal cell? Instrumentation and methods of the proteomics. Practical session. Atlas and first draft of the human proteome. Interactomics: methods and applications. Proteomics and protein function. Genomics and proteomics of parasitic organisms: malaria and leishmania. Proteomics and post-translational modifications (PTMs). Molecular imaging by mass spectrometry and applications. Biomedical and biotechnological applications of the proteomics: Biomarkers in biomedicine; Identification of drug and vaccine targets by differential proteomics, surfomics and immunomics; pathogen microorganisms identification ("BioTyper"). MS for protein structure/function analysis. Metabolomics. Networks and applications in pharmacology and toxicology.