Advanced Genomics and Proteomics 2015/2016

Code: 43473
ECTS Credits: 9

<table>
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<tr>
<th>Degree</th>
<th>Type</th>
<th>Year</th>
<th>Semester</th>
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<tr>
<td>4313794 Biochemistry, Molecular Biology and Biomedicine</td>
<td>OT</td>
<td>0</td>
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</table>

Contact

Name: Enric Querol Murillo
Email: Enric.Querol@uab.cat

Other comments on languages

approx 50% of the lectures

Use of languages

Principal working language: catalan (cat)

Teachers

Antoni Barbadilla Prados
Alfredo Ruiz Panadero
Nuria Rius Camps
Julia Lorenzo Rivera
Barbara Negre de Bofarull
Sònia Casillas Viladerrams
Raquel Egea Sánchez

Prerequisites

Languages: Lectures will be mainly in Spanish and English
Postgraduates in Biochemistry, Biotechnology, Biology, Biomedicine, Genetics, Microbiology, Chemistry, Informatics/Bioinformatics, Pharmacy, Medicine and Veterinary Medicine

Objectives and Contextualisation

The overall aim of the subject is to provide students an overview of Genomics and Proteomics including fundamentals, current techniques and applications. The specific objectives of Genómica 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 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…). And the first draft of the human Proteome and the Proteome Atlas

Skills
• Analyse and correctly interpret the molecular mechanisms operating in living beings and identify their applications.
• Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
• Continue the learning process, to a large extent autonomously.
• Develop critical reasoning within the subject area and in relation to the scientific or business context.
• Identify and use bioinformatic tools to solve problems in biochemistry, molecular biology and biomedicine.
• Integrate contents in biochemistry, molecular biology, biotechnology and biomedicine from a molecular perspective.
• Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
• Use and manage bibliography and IT resources related to biochemistry, molecular biology or biomedicine.
• Use scientific terminology to account for research results and present these orally and in writing.

**Learning outcomes**

1. Communicate and justify conclusions clearly and unambiguously to both specialist and non-specialist audiences.
2. Continue the learning process, to a large extent autonomously.
3. Develop critical reasoning within the subject area and in relation to the scientific or business context.
4. Identify and describe the different components in prokaryotic and eukaryotic genomes and proteomes.
5. Identify molecular mechanisms responsible for diseases.
6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
7. Use and manage bibliography and IT resources related to biochemistry, molecular biology or biomedicine.
8. Use scientific terminology to account for research results and present these orally and in writing.
9. Use the different methodologies, techniques and tools commonly used in genome sequencing, assembly and annotation.
10. Use the different methodologies, techniques and tools commonly used in proteomics and interactomics and metabolomics.

**Content**


PROTEOMICS: Update of Proteomics methods. Proteogenomics annotation. Determination of the protein biological function: function by context, moonlighting, etc. First draft of the human proteome and Proteome Atlas. Biomedical and biotechnological applications of Proteomics: Biomarkers in biomedicine; MS imaging; Identification of drug targets (i.e., malaria targets) and of virulence factors in reverse vaccinology by differential proteomics, surfomics and immunomics; pathogen identification ("BioTyper"). Metabolomics. Interactomics in Network pharmacology and Toxicology.

**Methodology**

Subject teaching includes three types of activities:
- Lectures. Spoken explanations of the subject that is to be learned accompanied by powerpoint presentations to help students visualize questions and answers.
- Reading and discussion. Students are expected to read a number of research papers during the course and participate in the critical discussion of the papers in the class room.
- Oral presentations. Students will prepare a subject and make an oral and powerpoint presentation of the subject to their peers.

### Activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning outcomes</th>
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<tbody>
<tr>
<td>Type: Directed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>45</td>
<td>1.8</td>
<td>5, 6, 8</td>
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<tr>
<td>Type: Supervised</td>
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<td></td>
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<tr>
<td>Oral presentations</td>
<td>40</td>
<td>1.6</td>
<td>1, 7, 8</td>
</tr>
<tr>
<td>Type: Autonomous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student work and learning</td>
<td>137</td>
<td>5.48</td>
<td>3, 5, 6, 2, 7, 8</td>
</tr>
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</table>

### Evaluation

Final grades are a weighed average of items:
- Attendance and participation in the classroom (20%)
- Oral presentation and defense (40%)
- Exam (40%)

The student will be "not qualifiable" when the number of evaluable tests/tasks/activities done by he student do not reach to a global minimal qualification of 5.0

### Evaluation activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Weighting</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning outcomes</th>
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</thead>
<tbody>
<tr>
<td>Exam</td>
<td>40%</td>
<td>2</td>
<td>0.08</td>
<td>4, 3, 5, 6, 1, 9, 10, 8</td>
</tr>
<tr>
<td>Lecture attendance</td>
<td>20%</td>
<td>0</td>
<td>0</td>
<td>6, 1</td>
</tr>
<tr>
<td>Oral presentation</td>
<td>40%</td>
<td>1</td>
<td>0.04</td>
<td>6, 1</td>
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</tbody>
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### Bibliography

**Basic books**

Additional journal references will be commented in the lectures

**Useful links**
- UAB Virtual Campus: https://cv2008.uab.cat/

Human Proteome Map: http://www.humanproteomemap.org/

ProteomicsDB: http://www.proteomicsdb.org/