Advanced Genomics and Proteomics

Code: 43473
ECTS Credits: 9

Contact
Name: Julia Lorenzo Rivera
Email: Julia.Lorenzo@uab.cat

Other comments on languages
approx 50% of the lectures

Teachers
Francesc Xavier Avilés Puigvert
Antoni Barbadilla Prados
Enric Querol Murillo
Alfredo Ruiz Panadero
Julia Lorenzo Rivera
Sònia Casillas Viladerrams

Use of Languages
Principal working language: catalan (cat)
approx 50% of the lectures

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.
Competences

- 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


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>
</tr>
</thead>
<tbody>
<tr>
<td>Type: Directed</td>
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<td></td>
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<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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<tr>
<td>Oral presentations</td>
<td>40</td>
<td>1.6</td>
<td>1, 7, 8</td>
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<tr>
<td>Type: Autonomous</td>
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<td></td>
<td></td>
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<tr>
<td>Student work and learning</td>
<td>137</td>
<td>5.48</td>
<td>3, 5, 6, 2, 7, 8</td>
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</table>

Assessment

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

Important: If plagiarism is detected in any of the works submitted, the student will fail the whole module.

Assessment Activities

<table>
<thead>
<tr>
<th>Title</th>
<th>Weighting</th>
<th>Hours</th>
<th>ECTS</th>
<th>Learning Outcomes</th>
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<tr>
<td>Exams</td>
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<td>2</td>
<td>0.08</td>
<td>4, 3, 5, 6, 1, 2, 9, 10, 8</td>
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<tr>
<td>Lecture attendance</td>
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<td>0</td>
<td>6, 1</td>
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<tr>
<td>Oral presentation</td>
<td>40%</td>
<td>1</td>
<td>0.04</td>
<td>6, 1, 7</td>
</tr>
</tbody>
</table>

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/