COURSE: MOLECULAR PHYSIOLOGY

SUBJECT MATTER: Cell Biology
MODULE: Molecular and Cell Biology
PROGRAM: Degree in Biotechnology

GENERAL FEATURES *
Type: ☐ Basic training, ☐ Compulsory, ☑ Elective,
☐ Final Degree Project, ☐ Practicum
Duration: Semestral Semester / s: 5
Number of ECTS credits: 5
Language / s: Spanish, Catalan, English

DESCRIPTION

SHORT DESCRIPTION AND JUSTIFICATION (of the meaning of the course in relation to the studies. Between 100 and 200 words)

The course will expose the student with the main concepts of homeostasis at the cellular, tissue, organ and system levels. The relation of the cell with the environment, the main ways of interaction and reaction. The student will learn about the molecular mechanisms related to growth and proliferation as well as basic cellular physiology related to each specific tissue type. The student will learn also about the main signals from the environment (signals) which create specific reactions (behaviour) in cells, using ligands to cell receptors or changes in membrane potential. Some examples of tissues and organs physiology will be presented such as glucose metabolism control, nervous system function and reproductive organ development and function.

COMPETENCES (of the course placed in relation to the pre-assigned competences in the subject matter)

- That students know how to apply their knowledge to their work or vocation in a professional manner, and have acquired the competencies that allow them to elaborate and defence arguments as well as to solve problems within their area of study. (CB2)

- Be able to understand and apply advanced knowledge of Biosciences and Engineering to the field of Biotechnology. (E3)

- Be able to use tools, systems or processes to carry out the activities in the field of Biotechnology according to the established requirements. (E4)

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PREVIOUS REQUIREMENTS * (modules, subject matters, courses or knowledge necessary for the follow-up of the subject. State previous courses required to be completed)

Biochemistry, Microbiology, Molecular Biology.

CONTENTS (List the content of the course, with up to two level detail)

1. Homeostasis
2. Cellular nutrition
   a. Transport through membrane
   b. Membrane potential
   c. Endocytosis/Exocytosis
   d. Cellular digestion
3. Cellular reproduction
   a. Cell Cycle, mitosis, meiosis
   b. Gametogenesis, fecundation, early egg development
4. Cellular relationship
   a. Static (endocrine secretion, paracrine secretion, autocrine secretion, etc.)
   b. Dynamic (migration, cytoskeleton, extracellular matrix)
   c. Membrane potential and Action potential
5. Cellular signaling
   a. Calcium signal, phospholipids, MAP kinases, PKA, PKC, cAMP
   b. Apoptosis and apoptotic signals
   c. Membrane receptors (Growth factor receptors, Integrins, etc.)
   d. GPCRs
6. Introduction to organ communication systems, nervous system, circulatory system, cardiac tissue, digestive system and reproductive system.
LEARNING ACTIVITIES * (Complete the table relating activities, workload in ECTS credits, and competences.)

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>ECTS Credits</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>1,3</td>
<td>E3, E4</td>
</tr>
<tr>
<td>Case and Problem-Solving Sessions</td>
<td>0,2</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Seminars</td>
<td>0,1</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Practical and Lab Work</td>
<td>-</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Presentations</td>
<td>-</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Personal Study</td>
<td>3,3</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Assessment Tasks (Exams, Continuous Assessment...)</td>
<td>0,1</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,0</td>
<td>CB2, E3, E4</td>
</tr>
</tbody>
</table>

TEACHING METHODOLOGY (justify the teaching methodology in relation to the competences and course contents. Between 100 and 200 words)

- **Lectures** - Presentation and explanation of contents by a teacher (possibly including demonstrations).
- **Case and Problem-Solving Sessions** - Resolution of exercises and problems, and exposition / discussion of cases by a teacher with the active participation of students.
- **Personal study activities** - Personal work of the student necessary to acquire the competences of each subject matter, and to assimilate the knowledge exposed in lectures and case and problem-solving sessions, using the recommended reference materials. They also include the preparation of tasks related to the other activities, and the preparation of exams.
- **Assessment Tasks** - Oral and / or written tests made during the academic period of a course, or once it has finished (final exams, follow-up controls).

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ASSESSMENT

ASSESSMENT METHODS * (Complete the table relating assessment methods, competences, and weight percentage in the course qualification)

<table>
<thead>
<tr>
<th>Assessment methods</th>
<th>Weight</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>40%</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Midterm Exam/s</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Continuous Assessment Activities</td>
<td>50%</td>
<td>CB2, E3, E4</td>
</tr>
<tr>
<td>Reports and Presentations</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lab or Field Work</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Projects</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Host Student Evaluation</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Participation</td>
<td>10%</td>
<td>CB2, E3, E4</td>
</tr>
</tbody>
</table>

LEARNING OUTCOMES (Explanation of the student's achievements that allow the assessment of competences, relating them to the competences and the assessment methods)

The student should be able to understand and apply advanced knowledge of Biosciences and Engineering to the field of MOLECULAR PHYSIOLOGY. (E2, E3)

The student should be able to use tools, systems or processes to carry out the activities in the field of MOLECULAR PHYSIOLOGY according to the established requirements. (CB2, E2, E3)

QUALIFICATION (Explanation of the qualification system)

The FINAL EXAM and the AVERAGE OF THE CONTINUOUS ASSESSMENT ACTIVITIES should be equal or higher than 4 (MAXIMUM QUALIFICATION FOR EACH IS = 10).

FINAL QUALIFICATION: FINAL EXAM (40%) + Control Exams (50%) + Participation (10%) = 100%

ASSESSMENT OF THE COMPETENCES (Describe the grading system for each competence in relation with the assessment tasks)

For the evaluation of CB2 competence the final exam (FE), control exams (CE), presentation works (PW) and participation (P) will be used as indicators.

For the evaluation of the E3 and E4 competences FE, CE and PW will be used as indicators.

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BIBLIOGRAPHY (Recommended and accessible to the student.)

**Molecular Cell Biology**
Lodish, Harvey; Berk, Arnold; Zipursky, S. Lawrence; Matsudaira, Paul; Baltimore, David; Darnell, James E.

Free Access:  

**Molecular Biology of the Cell**
Alberts, Bruce; Johnson, Alexander; Lewis, Julian; Raff, Martin; Roberts, Keith; Walter, Peter

Free Access:  

DOCUMENT HISTORY

PREVIOUS REVISIONS

CURRENT REVISION  (Indicate date and author / s)
13 of May, 2019. Dr. Carlos Semino Margrett

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