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

The laboratory activity is a fundamental part of the development and professional training of a biotechnologist. The subject should allow the students to acquire the basic knowledge of practical type that are applicable in cell culture laboratory, cell and molecular biology. This knowledge will be essential for the further development of other activities in both during the academic years and for their future professional life.

The subject includes the following basic contents: Sceptical techniques for the culture of mammalian cells (both in suspension cultures and in adherent cells), characterization of kinetic parameters of the two types of cell lines, cryopreservation of cell strains, production / expansion / differentiation of stem cells, physiological characterization of cells, production and characterization of an antibody, cellular transfection, detection of expression proteins at the cellular level by fluorescence microscopy techniques, etc.

There will also be trials of the use of toxic drugs that inhibit cell division and their possible use as anti-proliferative agents (anti-carcinogens).

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

- That students have the ability to gather and interpret relevant data (normally within their area of study) to think over and make judgments on relevant social, scientific or ethical issues. (CB3)
- Be able to work in a team. (T1)
- Be able to work in a multidisciplinary environment. (T2)
- Be able to design processes and experiments to carry out the activities in the different fields of Biotechnology according to the established requirements. (E5)
- Be able to analyse, integrate and interpret data and information in the field of Biosciences. (E7)

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• Be able to assess the risks in the use of chemical and biological substances. (E8)

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

The competences of the previous educational stages. Laboratory Subjects of the previous courses

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

PRACTICE 0: Introduction to animal cell culture

BLOCK 1

PRACTICE 1: Kinetic characterization of suspension cell cultures (Hibridoma). MAb production.
PRACTICE 2: Growth curve profile of an adherent-dependent tumoral cell line (Hela) (MTS assay).
PRACTICE 3: Cytotoxicity and cell viability assays (MTS)
PRACTICE 4: MAb purification and quantification.
PRACTICE 5: Analysis of Media for animal cell cultures.
PRACTICE 6: Obtaining of GFP-expressing cells with stable and non-stable expressing systems
PRACTICE 6.1: Obtaining plasmidic DNA from transformed bacterial cells
PRACTICE 6.2: Transfection of a mammalian cell line with two GFP-expressing vectors and its selection through G418 antibiotic

BLOCK 2

PRACTICE 7: Main cellular structures identification. F-actin, nucleus and cell membrane.
PRACTICE 8: Animal cells cryopreservation: thawing and seeding cells
PRACTICE 8.1.: Subculture, passaging, expansion and freezing of adherent cells
PRACTICE 9: Differentiation of human mesenchymal stem cells (hMSC) into adipocytes.
PRACTICE 10: Scale-up of adherent-dependent cell cultures. Cell growth on suspended Microcarriers cultures.
PRACTICE 11: Mab characterization and quantification

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COURSE: LABORATORY 6
(BIOTECHNOLOGY FOR HEALTH)

SUBJECT MATTER: Biotechnology for Health Lab
MODULE: Laboratories
PROGRAM: Degree in Biotechnology

Page 3 of 6

METHODOLOGY

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>-</td>
<td></td>
</tr>
<tr>
<td>Case and Problem-Solving Sessions</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Seminars</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Practical and Lab Work</td>
<td>3,5</td>
<td>T1, T2, E5, E8</td>
</tr>
<tr>
<td>Presentations</td>
<td>0,1</td>
<td>E7</td>
</tr>
<tr>
<td>Personal Study</td>
<td>0,3</td>
<td>E7, B3</td>
</tr>
<tr>
<td>Assessment Tasks (Exams, Continuous Assessment...)</td>
<td>0,1</td>
<td>E7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>B3, T1, T2, E5, E7. E8</td>
</tr>
</tbody>
</table>

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

- **Practical and Lab** - Period where the student performs laboratory activities or similar (computer practices, projects, workshops, etc.) under the direct supervision of a teacher.
- **Presentations** - Oral presentation by a student to a teacher and/or other students. The presentation can be a work prepared by the student through searches in published bibliography, or a summary of a practical work or a project.
- **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, cases, 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>30%</td>
<td>B3, E7</td>
</tr>
<tr>
<td>Midterm Exam/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous Assessment Activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reports and Presentations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab or Field Work</td>
<td>70%</td>
<td>T1, T2, E5, E8</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></td>
<td></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)

- Learn how to handle cell culture in sterile conditions.
- Know the culture techniques necessary for the culture of mammalian and human cells in suspension and adherents. (E5 and E7)
- Be able to use instrumentation for detection, analysis, extraction, separation and purification of biomolecules (T1, T2, E5, E8)
- Be able to plan and execute experiments (B3, T1, T2, E5, E7, E8)
- Be able to use transfection and cloning techniques. (T1, T2, E5, E8)
- Be able to evaluate the effect of an anti-proliferative agent.

QUALIFICATION (Explanation of the qualification system)

The final grade of the Laboratory of Biotechnology for Healthcare (CLBS) will be obtained from the grade of the experimental work of the Laboratory of Biotechnology for Healthcare (TELBS) and of the final exam of the laboratory of Biotechnology for Healthcare (EFLBS). The note of the experimental work of the Laboratory of Biotechnology for Healthcare (TELBS) will be calculated as follows (total 70% of the grade):

- 10% Note from the Laboratory Login Book
- 15% Control
- 20% Reports of results (Equal grade for all members of the group)
- 15% Grade "individual development in the laboratory" *
- 10% Presentation of a practice results

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* Attendance, attitude in the laboratory and aptitude to solve the different problems / proposed practices will be taken into account.

The experimental work grade must be greater than or equal to 4 in order to pass.

The final exam note of the Health Biotechnology Laboratory (EFLBS) will be the grading obtained in the final exam carried out by the student. The note of the exam must be greater than or equal to 4 in order to pass. The final qualification of the Laboratory of Biotechnology for Healthcare (CLBS) will be obtained by calculating the weighted average of the grade of the experimental work of the laboratory of Biotechnology for Healthcare (TELBS, 70%) and the note of the final exam of the Laboratory of Biotechnology for Healthcare (EFLBS, 30%). If any of the two notes is lower than 4, the grading from the Laboratory of Biotechnology for Healthcare (CLBM) will be the lowest of both. If both grades are equal to or greater than 4, the qualification of the Laboratory of Biotechnology for Healthcare (CLBS) is calculated:

\[ CLBS = 0.7 \text{ TELBS} + 0.3 \text{ EFLBS}. \]

In order to pass the subject, the final grade must be greater than or equal to 5. In the event that the final grade is less than 5, it can be recovered through another exam, or another type of activity, at the discretion of the teacher.

In case of not failing the subject after having exhausted the two exams of the regular course, the student must repeat the subject.

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

- The evaluation of the competences T1, T2, E5 and E8 the grade of experimental work will be used as indicator.
- The evaluation of the rest of the competences, the indicator used will be the grade of the final exam of the subject (E7).

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**COURSE: LABORATORY 6  
(BIOTECHNOLOGY FOR HEALTH)**

**SUBJECT MATTER:** Biotechnology for Health Lab  
**MODULE:** Laboratories  
**PROGRAM:** Degree in Biotechnology

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**BIBLIOGRAPHY** (Recommended and accessible to the student.)

- CURRENT PROTOCOLS IN MOLECULAR BIOLOGY. 2014. Wiley, USA.  
  (http://www.currentprotocols.com/WileyCDA/).

- Protocolos y Technical Notes librados por el profesor a través del campus virtual.

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**DOCUMENT HISTORY**

**PREVIOUS REVISIONS** (Indicate date and author / s, first the most recent one)

**CURRENT REVISION** (Indicate date and author / s)  
March 21st 2019, Dr. Martí Lecina

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