

**COURSE DATA****Data Subject**

|                      |                                             |
|----------------------|---------------------------------------------|
| <b>Code</b>          | 46488                                       |
| <b>Name</b>          | Stem Cells: Biology, study and applications |
| <b>Cycle</b>         | Master's degree                             |
| <b>ECTS Credits</b>  | 3.0                                         |
| <b>Academic year</b> | 2023 - 2024                                 |

**Study (s)**

| <b>Degree</b>                                            | <b>Center</b>                      | <b>Acad. year</b> | <b>Period</b> |
|----------------------------------------------------------|------------------------------------|-------------------|---------------|
| 2254 - M.U. en Aproximaciones Moleculares CC Salud 23_V3 | Faculty of Medicine and Odontology | 1                 | First term    |

**Subject-matter**

| <b>Degree</b>                                            | <b>Subject-matter</b>                                      | <b>Character</b> |
|----------------------------------------------------------|------------------------------------------------------------|------------------|
| 2254 - M.U. en Aproximaciones Moleculares CC Salud 23_V3 | 1 - Molecular technologies for research in health sciences | Obligatory       |

**Coordination**

| <b>Name</b>                   | <b>Department</b>                       |
|-------------------------------|-----------------------------------------|
| GALAN ALBIÑANA, AMPARO        | 30 - Biochemistry and Molecular Biology |
| O'CONNOR BLASCO, JOSE ENRIQUE | 30 - Biochemistry and Molecular Biology |

**SUMMARY**

In the Stem Cells: Biology, Study and Applications course, the student will become familiar with the biological concepts and research techniques of stem cells and the foreseeable applications of human stem cells in the new area of Regenerative Medicine, as well as in research and therapy of cancer and other pathologies.

Lessons will address the molecular mechanisms that regulate the cell cycle, proliferation, differentiation, and apoptosis of embryonic and adult stem cell populations under normal and pathological conditions. The biological aspects of embryonic stem cells, induced pluripotent cells, adult stem cells and tumor stem cells will be described.

Current cellular and molecular techniques and the main animal models in stem cell research will be reviewed.

The concept of Regenerative Medicine will be addressed by first describing the organic and tissue failures that benefit from stem cell replacement, as well as the basic and applied aspects of Tissue Engineering and Biomaterials.



Through laboratory sessions, the student will face in vitro experimental studies typical of research on stem cells in cancer and Regenerative Medicine.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

No enrollment restrictions have been specified with other subjects in the curriculum.

## OUTCOMES

### 2254 - M.U. en Aproximaciones Moleculares CC Salud 23\_V3

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Conocer en profundidad y comprender la organización a nivel molecular de células, sistemas y procesos de relevancia en las Ciencias de la Salud.
- Conocer en profundidad y comprender las bases moleculares de la enfermedad.
- Conocer en profundidad y comprender las metodologías de investigación básica aplicables a las Ciencias de la Salud.
- Tener capacidad de analizar y sintetizar un problema.
- Tener capacidad de comunicación oral y escrita en una segunda lengua científica.
- Tener capacidad de localizar información.
- Tener capacidad de trabajar en equipo
- Tener capacidad de desarrollar un trabajo interdisciplinar.



- Conocer y comprender los conceptos básicos y las aplicaciones en investigación básica y clínica de las células madre.
- Conocer, comprender y manejar en la práctica métodos de estudio de las células madre.
- Aprender a identificar, manejar y presentar adecuadamente en informes y exposiciones públicas, conocimientos existentes sobre células madre, usando como vehículo la lengua inglesa.

## LEARNING OUTCOMES

English version is not available

## DESCRIPTION OF CONTENTS

**1. BLOCK 1. Introduction to the Subject. Introduction to Stem Cells and Regenerative Medicine.**

**2. BLOCK 2. Organic failure and the origin of human chronic diseases**

**3. BLOCK 3. Characteristics and Sources of Human Stem Cells**

**4. BLOCK 4. Omics Technologies in Stem Cell Research**

**5. BLOCK 5. Applications of Stem Cells in Regenerative Medicine**

**6. BLOCK 6. Stem Cells and Cancer**

**7. BLOCK 7. Practical Aspects of the Work with Stem Cells**

**8. BLOCK 8. Laboratory Practicals**

**WORKLOAD**

| ACTIVITY             | Hours        | % To be attended |
|----------------------|--------------|------------------|
| Theory classes       | 16,00        | 100              |
| Group work           | 10,00        | 100              |
| Laboratory practices | 4,00         | 100              |
| <b>TOTAL</b>         | <b>30,00</b> |                  |

**TEACHING METHODOLOGY****English version is not available****EVALUATION**

The evaluation of student learning will be carried out by evaluating the following sections:

1. Evaluation of the theoretical and practical contents of the subject, with questions of different formats. This test will be worth up to 50% of the final mark and will be carried out by means of a written test at the end of the first semester.
2. Presentation of a written work on the technological or biomedical relevance of Stem Cells. This part will have a value of up to 40% of the final grade.
3. Student interest in the subject, expressed as the participation in organized discussions, the answers to questions asked by the teachers in the class, the attendance at personal tutorials and/or any other type of activity carried out by the student in relation

to the subject. These concepts will add up to 10% in the final grade of the subject.

**REFERENCES****Basic**

- Lanza, R. Essentials of Stem Cell Biology. Academic Press (2009)
- Stem Cell Biology in Normal Life and Diseases  
<https://www.intechopen.com/books/stem-cell-biology-in-normal-life-and-diseases>
- Stem Cells in Clinic and Research  
<https://www.intechopen.com/books/stem-cells-in-clinic-and-research>
- Regenerative Medicine and Tissue Engineering  
<https://www.intechopen.com/books/regenerative-medicine-and-tissue-engineering>
- Cells and Biomaterials in Regenerative Medicine  
<https://www.intechopen.com/books/cells-and-biomaterials-in-regenerative-medicine>



### Additional

- - The Stem Book. <http://www.stembook.org>
- Euro Stem Cell. <http://www.eurostemcell.org/>
- Tissue Regeneration - From Basic Biology to Clinical Application  
<https://www.intechopen.com/books/tissue-regeneration-from-basic-biology-to-clinical-application>
- Autoimmune Diseases - Contributing Factors, Specific Cases of Autoimmune Diseases, and Stem Cell and Other Therapies  
<https://www.intechopen.com/books/autoimmune-diseases-contributing-factors-specific-cases-of-autoimmune-diseases-and-stem-cell-and-other-therapies>
- 43096 Células Troncales: Biología, estudio y aplicaciones 5
- BORRADOR
- Guía Docente
- 43096 Células Troncales: Biología, estudio y aplicaciones
- Diabetes Mellitus - Insights and Perspectives  
<https://www.intechopen.com/books/diabetes-mellitus-insights-and-perspectives>
- Cardiomyopathies - Types and Treatments  
<https://www.intechopen.com/books/cardiomyopathies-types-and-treatments>
- Liver Regeneration  
<https://www.intechopen.com/books/liver-regeneration>
- Advanced Understanding of Neurodegenerative Diseases  
<https://www.intechopen.com/books/advanced-understanding-of-neurodegenerative-diseases>
- Células Madre y Terapia regenerativa. F de Pablo y M Cascales, eds., Monografías de la Real Academia Nacional de Farmacia, Monografía XXVII (2009)  
<https://www.analesranf.com/index.php/mono/issue/view/360>