



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### **Stem Cells in Somatic Tissue Cell Homeostasis**

2425-1-F0601Q070

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#### **Aims**

The aim of this course is to extend and elaborate current notions on somatic stem cells functions, focusing in particular on tissue homeostasis.

1. Knowledge and understanding:  
Students will be able to understand how stem cells regenerate our tissues and replace differentiated cells lost by the normal tissue homeostasis.
2. Applied knowledge and understanding:  
The course will give to the students a scientific background that can be applied to understand projects aimed to the study the molecular basis of tissue regeneration as well as studies aimed at evaluating the molecular mechanisms involved in stem cell proliferation and differentiation abilities.
3. Making judgments  
Students will be able to critically review the scientific bibliography inherent research studies investigating stem cells.
4. Communication skills:  
Students will be able to use an appropriate scientific language to define stem cells types and describe their functions, morphology and antigenic properties. Students will be able to describe mechanisms sustaining tissue homeostasis by using appropriate scientific terms.
5. Learning skills:  
This course will give to the students the information to achieve a more comprehensive knowledge of the physiology of our tissues.

## Contents

Comprehensive knowledge of stem cell field: definition, categories, functional characteristics, definition. General mechanisms and models describing cell homeostasis in somatic tissues. Description of the different stem cells type, considering their developmental origin, their role in tissue homeostasis.

## Detailed program

- Introduction and definitions: Stemness, stemness-inherent functional parameters and stem cells self-renewal, actual and potential stem cells and the concept of cell homeostasis
- Cell Compartments I : homeostasis of stem cell compartment, symmetric and asymmetric cell division, deterministic and stochastic models
- Cell compartments II: differentiation, functional maturation, transit amplifying progenitors and their role in tissue and cell homeostasis
- Cell hierarchy models I: Single cells model, spiral-model.
- Stem cell niche
- Somatic Stem Cell model (general informations)
- Intestinal Stem Cells
- Hematopoietic Stem Cells
- Epidermal Stem Cells
- Neural Stem Cells
- Embryonic Stem Cells

## Prerequisites

The knowledge of the basic mechanisms of cell biology, human physiology and histology is required.

## Teaching form

The course is composed by 21 lectures (18 lessons dedicated to delivered didactic -Didattica Erogativa - and 3 lessons dedicated to interactive teaching - Didattica Interattiva).

The 18 lessons of delivered didactic will be focused on the presentation of contents by the lecturer: 12 lessons will be conveyed by means of face-to-face lectures and 6 lessons will be conveyed as distance learning)

Within the 3 lessons dedicated to interactive teaching the students (by groups of about 4 students) will prepare a

short seminar (15-20 minutes) regarding a topic of the course. The first two lessons will be dedicated to literature selection. In the last lesson students will present their work to the class. The seminar will be included as part of the final evaluation (more details in the assessment section).

These 3 lessons of interactive learning will be conveyed by face-to-face mode.

## **Textbook and teaching resource**

Stem cells, di C.S. Potten, Academic Press. Classes are based on original or review articles in English language. Fundamental articles and the ppt slides presented will be available on the e-learning system.

## **Semester**

Second semester

## **Assessment method**

Students will be evaluated by three written "open" questions at the end of the course . The questions will be aimed at evaluating both the knowledge of the topics discussed throughout classes and the ability to synthesize the most important elements of each topic. First question will be focused on general aspects of cells homeostasis and stem cells definition. Second and third questions will be focused on one of the stem cells types described.

The seminars presented by the students within the interactive teaching will receive a score of: 0, 1 or 2 that will be added to the evaluation of the written exam (if the final score will be over 30, the student will receive 30 cum laude). Criteria for the score assessment will be: clarity of the presentation, use of the correct scientific language and ability to synthesize the topics of the research articles).

If required by the student or the teacher, a critical discussion of the written assessment will complete the evaluation.

## **Office hours**

Email to [biocell1@libero.it](mailto:biocell1@libero.it) to schedule a meeting

## **Sustainable Development Goals**

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION

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