



### DEVELOPMENTAL AND STEM CELL BIOLOGY

<b>Enrollment year</b>	2020/2021
<b>Academic year</b>	2021/2022
<b>Regulations</b>	DM270
<b>Academic discipline</b>	BIO/06 (COMPARATIVE ANATOMY AND CYTOLOGY)
<b>Department</b>	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
<b>Course</b>	EXPERIMENTAL AND APPLIED BIOLOGY
<b>Curriculum</b>	Scienze biomediche molecolari
<b>Year of study</b>	2°
<b>Period</b>	1st semester (01/10/2021 - 14/01/2022)
<b>ECTS</b>	6
<b>Lesson hours</b>	48 lesson hours
<b>Language</b>	Italian
<b>Activity type</b>	ORAL TEST
<b>Teacher</b>	GARAGNA SILVIA (titolare) - 6 ECTS
<b>Prerequisites</b>	Good knowledge of cell and molecular biology, genetics.
<b>Learning outcomes</b>	<p>The course aims at providing students with basic knowledge of the cellular and molecular mechanisms of development. Also, the course aims at providing basic knowledge on the properties and functional plasticity of stem cells.</p> <p>At the end of the course the student will acquire specific and critical knowledge oo:</p> <ol style="list-style-type: none"><li>1. the modalities of development and differentiation of the male and female gonads and gametes;</li><li>2. the mechanisms of fertilization and peri-implantation embryonic development;</li><li>3. the derivation of stem cells from mammalian embryos;</li><li>4. the cellular and molecular characteristics of the different types of stem cells;</li></ol>

5. the localization and tissue regulation of stem cells.

**Course contents**

**DEVELOPMENTAL BIOLOGY**

Mechanisms of sex determination. Gonad differentiation and sexual differentiation. Germ cell development. Spermatogenesis and oogenesis. Fertilisation. Segmentation. Embryonic genome activation. Imprinting. Genome equivalence. Cloning. Origin and specification of embryonic germ layers. Gastrulation.

**BIOLOGY OF STEM CELLS**

Sources and molecular characteristics of stem cells. Origin of embryonic stem cells and their derivation methods. The pluripotency molecular core and its regulation. Differentiation of embryonic stem cells. Cell reprogramming and the induction of pluripotency. Characteristic and function of spermatogonia in the mammalian testis. Role of stem cells in adult tissues. The stem cell niche.

**Teaching methods**

The course is carried out through lectures using Power Point presentations. Lessons will be available to students as pdf files

The course can possibly be supplemented by in-depth seminars.

No educational or tutored seminars are planned.

**Recommended or required readings**

Giudice et al. *Biologia dello Sviluppo*, Piccin Editore, 2010, or other books of Developmental Biology. Slides of the lessons will be given.

**Assessment methods**

The exam is written and is composed of two questions: one for the development biology module and one for the stem cell biology module to be answered in full.

The duration of the test is 1 hour and the evaluation is out of thirty.

**Further information**

The teacher is available for clarification on the contents of the lessons following appointment.

**Sustainable development goals - Agenda 2030**

Goal 4. High quality education

[The goals](#)