CELLULAR PHYSIOLOGY
and
CELL CULTURE LABORATORY

Prof. Marta Czernik
Experimental Embryology Laboratory
mczernik@unite.it

General Course:

CELL BIOLOGY AND METHODOLOGIES FOR THE STUDY OF CELLS AND TISSUES (15 CFU)**-** ***Prof. Mauro***

Course 1: **Cellular physiology** (4 CFU) - *Prof. Marta Czernik*

Course 2: **Cell culture laboratory** (3 CFU) - *Prof. Marta Czernik*

Course 3: **Cytology and Histology** (4 CFU)- *Prof. Annunziata Mauro*

Course 4: **Morphological analysis of cells and tissues laboratory** (4 CFU) - *Dr. Mohammad El Khatib*

CELLULAR PHYSIOLOGY *[32 hours frontal lessons (**4 CFU**)]*

Tuesday: 9:00 - 11:00

Thursday 14:00 - 16:00

Present: Room 4

Online: meet.google.com/hjn-yhyr-wsr

CELLULAR PHYSIOLOGY-

CELL CULTURE LABORATORY *(starts from 16 October)*

*[30 hours laboratory activities (**3 CFU**)]*

Monday: 14:00 - 16:00

Thursday: 16:00 - 18:00

Groups up to 15 persons

Present: Laboratory Barone, Didactic Laboratory (4th Floor)

Online: VIDEO, Tutorials

CELLULAR PHYSIOLOGY

is the branch of biology that studies how cells function - their physical, chemical, and biological processes - including how they obtain and use energy, communicate, transport substances, divide, and respond to their environment.

CELLULAR PHYSIOLOGY

1. 30/09/25 (*Tuesday):* Seminar -University of Vienna
2. 2/10/25 *(Thursday)*: Introduction to the course
3. 7/10/25 (*Tuesday)*: Introduction to the cell and Cellular Physiology
4. 9/10/25 *(Thursday)*: Structure of the Cellular Membrane
5. 14/10/25 *(Tuesday)*: Membrane Proteins + *Primary Culture*
6. 16/10/25 *(Thursday)*: Transport Across the Membrane + *Osmosis*
7. 21/10/25 *(Tuesday)*: Intracellular Compartments and Transports
8. **TEST I** *(Thursday):* **23/10/2025**

1. 28/10/25 (*Tuesday):* *Cytoskeleton* + *Cellular Staining*
2. 30/10/25 *(Thursday)*: Nucleus and Cell Cycle
3. 4/11/25 (*Tuesday)*: Mitochondria + *Karyotype*
4. 6/11/25 *(Thursday)*: Cell Death + *Cell counting/freezing*
5. **TEST II (*Tuesday):* 11/11/25**

---

1. 13/11/25 *(Thursday)*: Lyophilisation vs Cryopreservation
2. 18/11/25 (*Tuesday)*: Assisted Reproduction Technologies (ART) models: SCNT, ICSI, IVF
3. **FINAL Test** *(Thursday):* **20/11/25**

Cellular Physiology

Learning Objectives

By the end of the Cellular Physiology course:

1. **Understand Cell Structure and Function** – Describe the structure and function of various cellular organelles and their roles in maintaining cell homeostasis.
2. **Membrane Dynamics** – Explain the mechanisms of membrane transport, including diffusion, osmosis, active transport, and vesicular trafficking.
3. **Analyze Cellular Communication** – Understand signal transduction pathways and the role of receptors, second messengers, and intracellular signaling in cellular responses.
4. **Cell Cycle and Growth** – Describe the regulation of the cell cycle, mitosis, meiosis, and the molecular basis of cell proliferation and apoptosis.
5. **Interpret Electrophysiological Principles** – Understand the generation and propagation of action potentials and the role of ion channels in cellular excitability.
6. **Develop Critical Thinking and Experimental Skills** – Analyze and interpret experimental data related to cellular processes and design basic experiments to investigate cellular functions.

CELL CULTURE LABORATORY

1. 16/10/25 (Thursday): Establishment of Primary Culture
2. 20/10/25 (Monday): Secondary Culture
3. 23/10/25 (Thursday): Osmosis
4. 30/10/25 (Thursday): Fluorescent Staining of the the Cell organelles
5. 03/11/25 (Monday): Karyotype
6. 06/11/25 (Thursday): Cell counting and Cell Freezing
7. 10,13/11/25 (Monday; Thursday): Embryology
8. **17/11/25 (Monday): FINAL TEST**

Cell Culture Laboratory

Learning Objectives

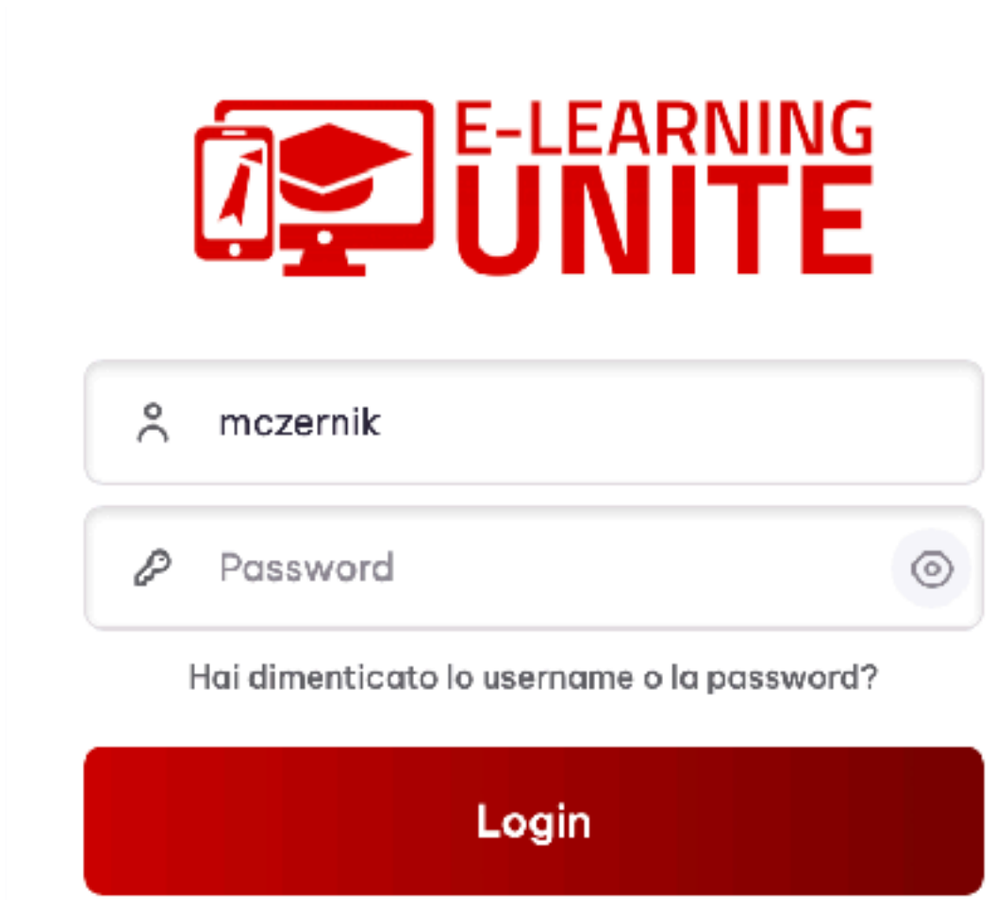
By the end of the *Cell Culture Laboratory* course:

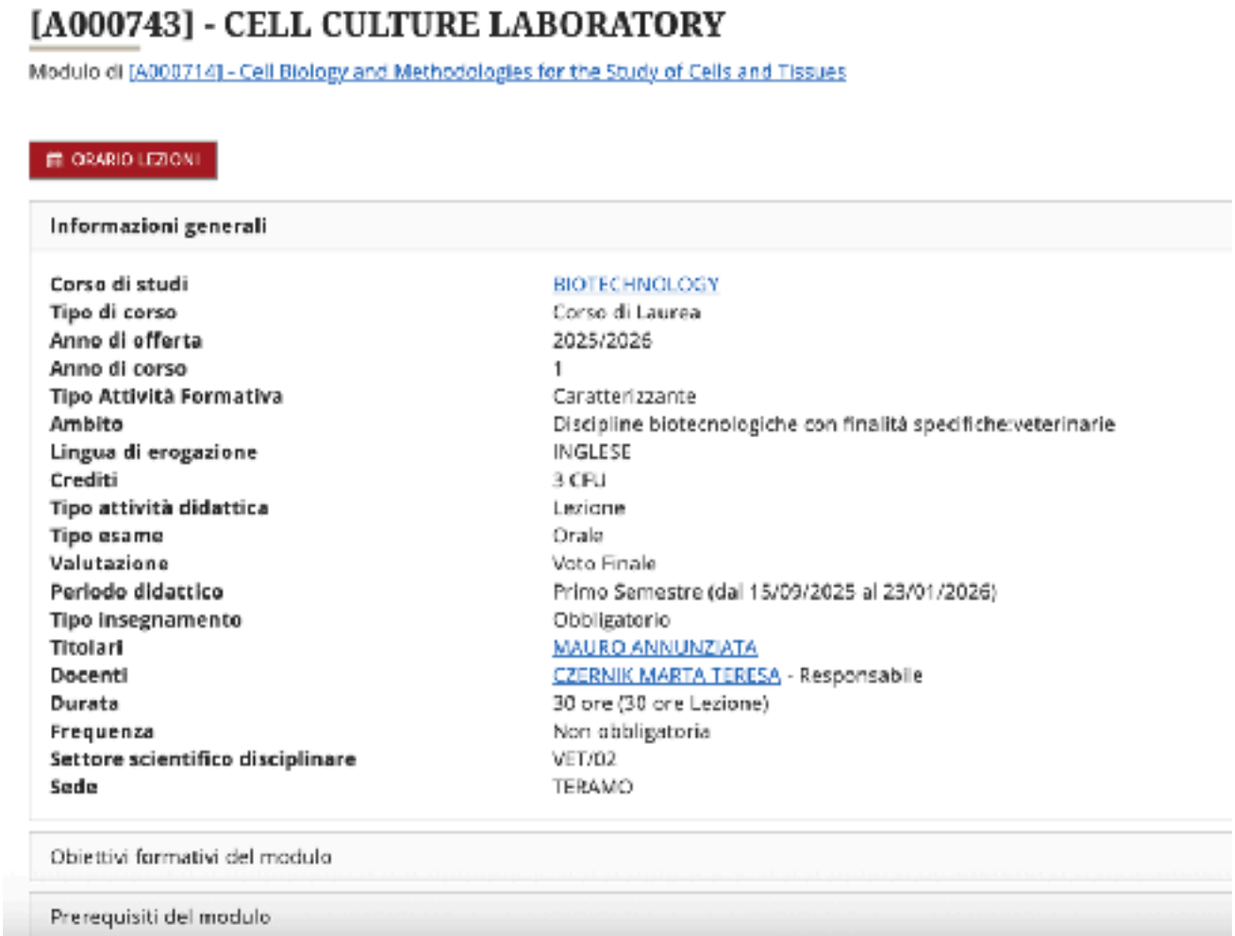
- Establish and maintain sterile conditions in the laboratory for the work area, equipment, saline solutions, culture media, and cell cultures.
- Cellular membrane Functions - ***Osmosis***
- Understand the main methods for isolating and purifying cells from complex tissues (**P*rimary and secondary cell culture***).
- Assess cell viability using the most common assays employed in cell culture laboratories.
- Perform cell counts and determine cell concentrations in suspensions.
- Understand basic techniques for cryopreserving eukaryotic cells.
- Know and reproduce basic protocols for in vitro culture of mammalian cells (cellular staining, Karyotype)
- Bases of embryology

https://elearning.unite.it/

https://www.unite.it/UniTE/

https://unite.coursecatalogue.cineca.it/





[A000743] - CELL CULTURE LABORATORY

Modulo di [A000714] - Cell Biology and Methodologies for the Study of Cells and Tissues

ORARIO LEZIONI

Informazioni generali

Corso di studi	BIOTECHNOLOGY
Tipo di corso	Corso di Laurea
Anno di offerta	2025/2026
Anno di corso	1
Tipo Attività Formativa	Caratterizzante
Ambito	Discipline biotecnologiche con finalità specifiche:veterinarie
Lingua di erogazione	INGLESE
Crediti	3 CFU
Tipo attività didattica	Lezione
Tipo esame	Orale
Valutazione	Voto Finale
Periodo didattico	Primo Semestre (dal 15/09/2025 al 23/01/2026)
Tipo insegnamento	Obbligatorio
Titolari	MAURO ANNUNZIATA
Docenti	CZERNIK MARTA TERESA - Responsabile
Durata	30 ore (30 ore Lezione)
Frequenza	Non obbligatoria
Settore scientifico disciplinare	VET/02
Sede	TERAMO

Obiettivi formativi del modulo

Prerequisiti del modulo

FINAL VOTEs:

CELLULAR PHYSIOLOGY

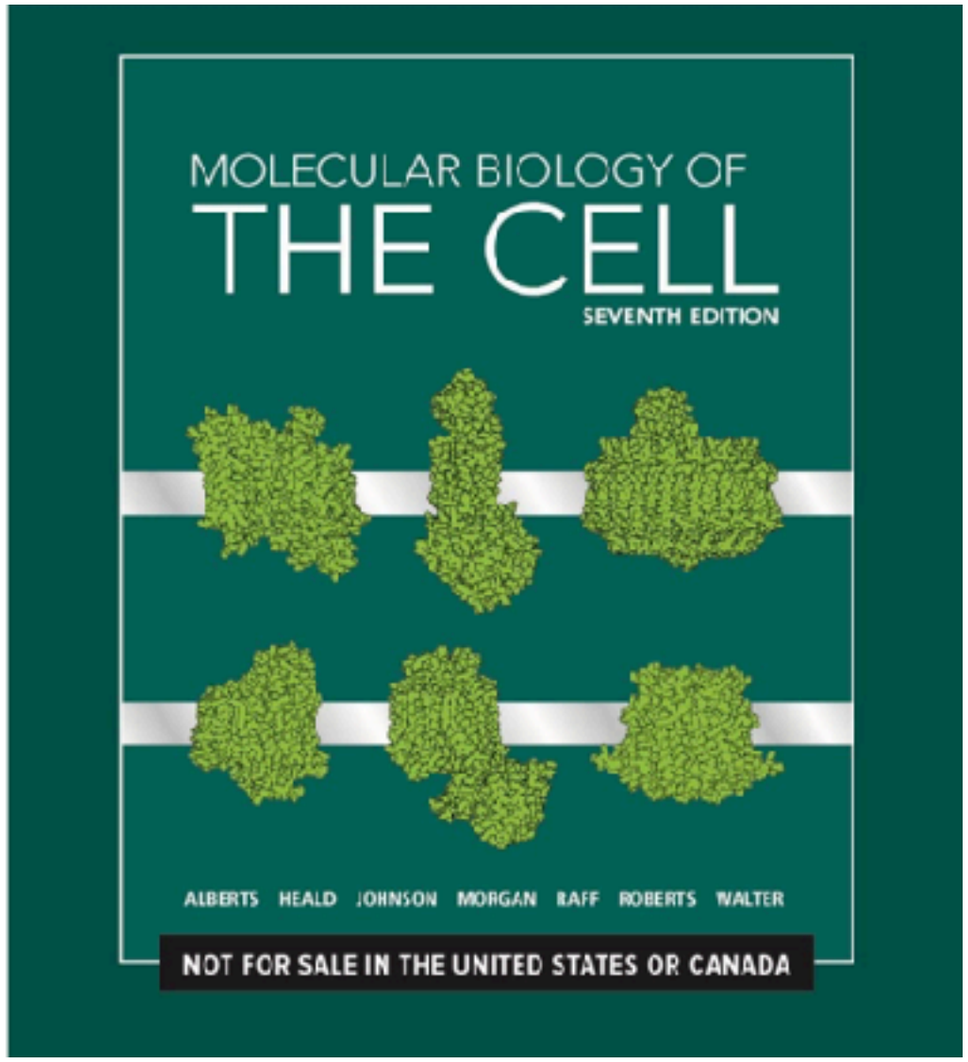
The final grade will be based on the **average of the three intermediate** tests (taken online, multiple-choice with one correct answer).

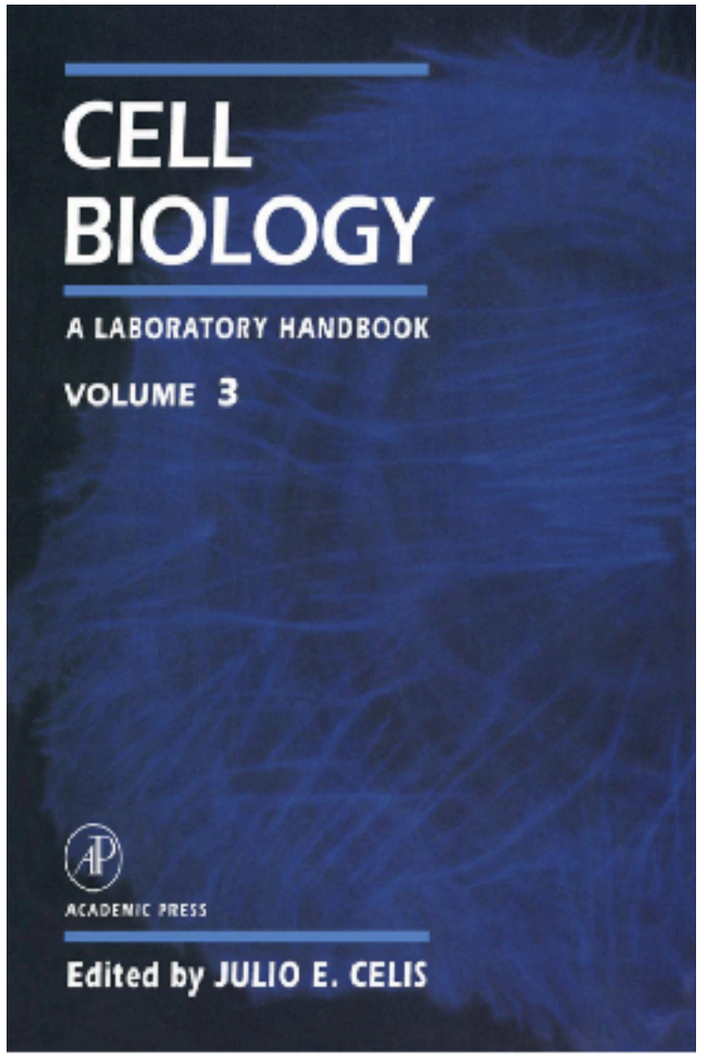
To improve the grade, it will be possible to take an oral exam (but...!!) or final total test written.

CELL CULTURE LABORATORY

Test (online, multiple-choice with one correct answer).

To improve the grade, you may submit a laboratory report of the activities.





1. **Molecular Biology of the Cell -** *Bruce Alberts*

2. **Cell Biology, A Laboratory Handbook** - *edited by Julio E. Celis*

3. **Slides**

4. **Video on E-learning**

https://docs.google.com/forms/d/1xRFu2QDbxETVyRLqqHZKPI3djV6YeUCwG1erH5rFgew/edit

What inspired you to choose biotechnology as your field of study?

How do you imagine your future as a biotechnologist — in a lab, in industry, or maybe creating your own start-up?