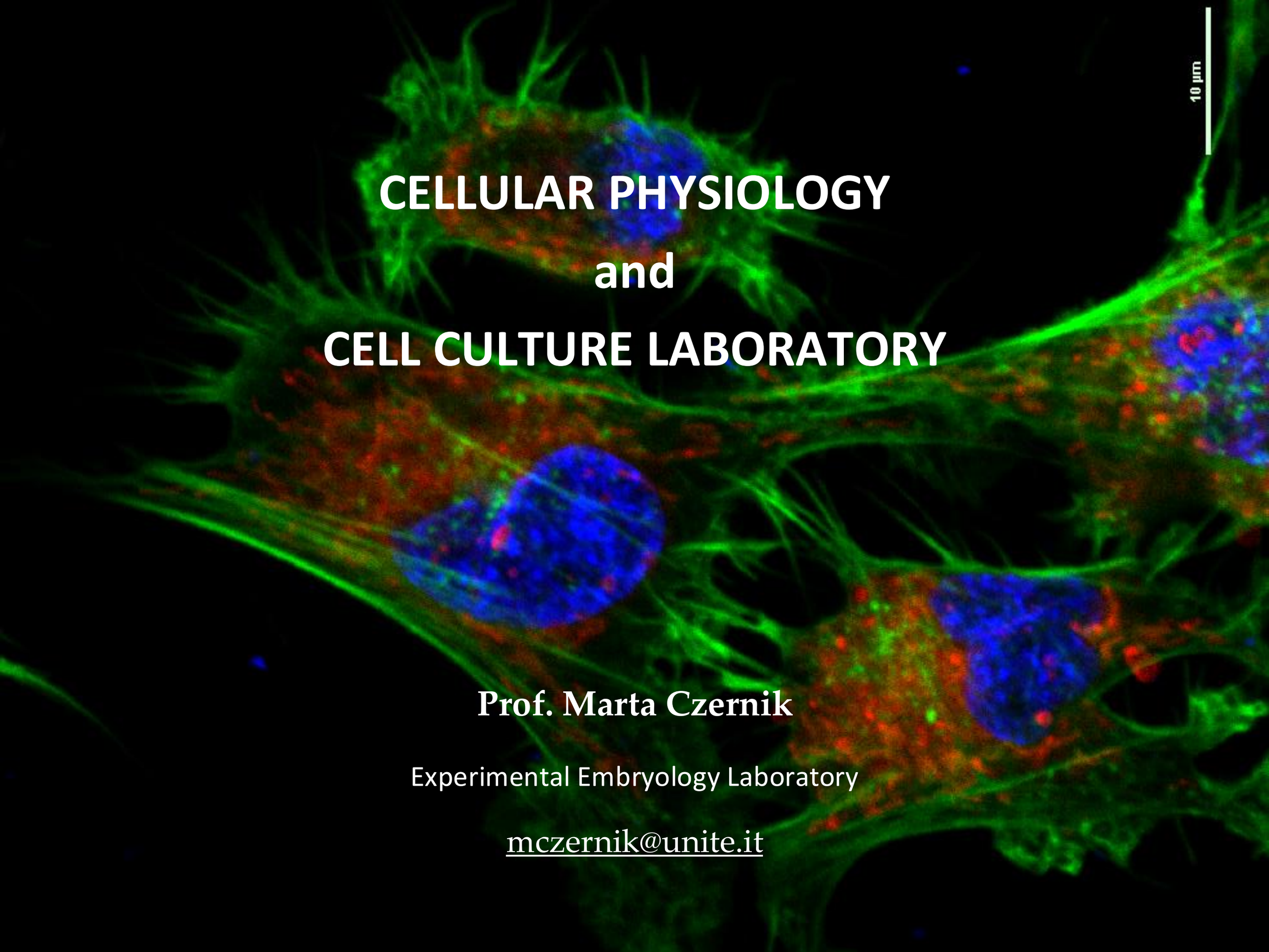


CELLULAR PHYSIOLOGY
and
CELL CULTURE LABORATORY

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** (32h, 4 CFU) - *Prof. Marta Czernik*
Course 2: **Cell culture laboratory** (30, 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) - *Prof. Annunziata Mauro*

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

Tuesday: 8:30 - 10:30
Thursday 14:30 (15.30) - 16:30 (17:30)

Present: Check on Unite webside
Online: meet.google.com/bpm-xccz-oiw

CELL CULTURE LABORATORY *(starts from **07** October)*

*[30 hours laboratory activities (**3 CFU**)]*
Thursday: 14:30 - 18:30
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.

DATA	Hour	Lesson	Type
29.09.2026	8.30 – 10.30 (2h)	Introduction to the course	Theoretical
30.09.2026	14.30 – 16.30 (2h)	Introduction to the Cell and Cellular Physiology	Theoretical
06.10.2026	8.30 – 10.30 (2h)	Primary Culture and Cell Culture Laboratory	Theoretical
07.10.2026	14.30 – 18.30 (4h) Cell Culture Laboratory	Primary Culture	Practical
13.10.2026	8.30 – 10.30 (2h)	Structure of the Cellular Membrane	Theoretical
14.10.2026	14.30 – 16.30 (2h)	Membrane Proteins	Theoretical
20.10.2026	8.30 – 10.30 (2h)	Transport Across the Membrane + Osmosis	Theoretical
21.10.2026	14.30 – 18.30 (4h) Barone	Osmosis	Practical
27.10.206	8.30 – 10.30	Intracellular Compartments and Transports	Theoretical
28.10.2026	14.30 – 16.30	TEST I	

03.11.2026 - Martedi	8.30 – 10.30	Cytoskeleton + Cellular Staining	Theoretical
04.11.2026 - Mercoledi	14.30 – 18.30 (4h) Barone	Fluorescent Staining of the the Cell organelles	Practical
10.11.2026 - Martedi	8.30 – 10.30 (2h)	Nucleus and Cell Cycle + Kariotype	Theoretical
11.11.2026 - Mercoledi	14.30 – 18.30 (4h) Barone	Kariotype	Practical
17.11.2026 - Martedi	8.30 – 10.30 (2h)	Mitochondria and Energy	Theoretical
18.11.2026 - Mercoledi	14.30 – 16.30 (2h)	Cell Death(s) + Cell counting/freezing	Theoretical
24.11.2026 - Martedi	8.30 – 10.30 (2h) Barone	Cell counting/freezing (group A + B)	Practical
25.11.2026 - Mercoledi	14.30 – 16.30 (2h) Barone	Cell counting/freezing (group C + D)	Practical
01.12.2026 - Martedi	8.30 – 10.30 (2h)	TEST 2	

02.12.2026 - Mercoledi	30.– 16.30 (2h)	Lyophilisation vs Cryopreservation	Theoretical
09.12.2026 - Mercoeldi	14.30 – 16.30 (2h)	Nuclear reporgrammin g, Cell Differentiation, Assisted Reproduction Technologies (ART) models: SCNT, ICSI, IVF	Theoretical
15.12.2026 - Martedi	8.30 – 10.30 (2h) Cell Culture Laboratory	Embryolgy	Practical
16.12.2026 - Mercoledi	14.30 – 18.30 (4h) Cell Culture Laboratory	Embryology	Practical
January 2027	(2h)	FINAL TEST	

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. Establishment of Primary Culture
2. Secondary Culture
3. Osmosis
4. Fluorescent Staining of the the Cell organelles
5. Karyotype
6. Cell counting and Cell Freezing
7. Embryology
8. **FINAL TEST**

Cell Culture Laboratory

Learning Objectives

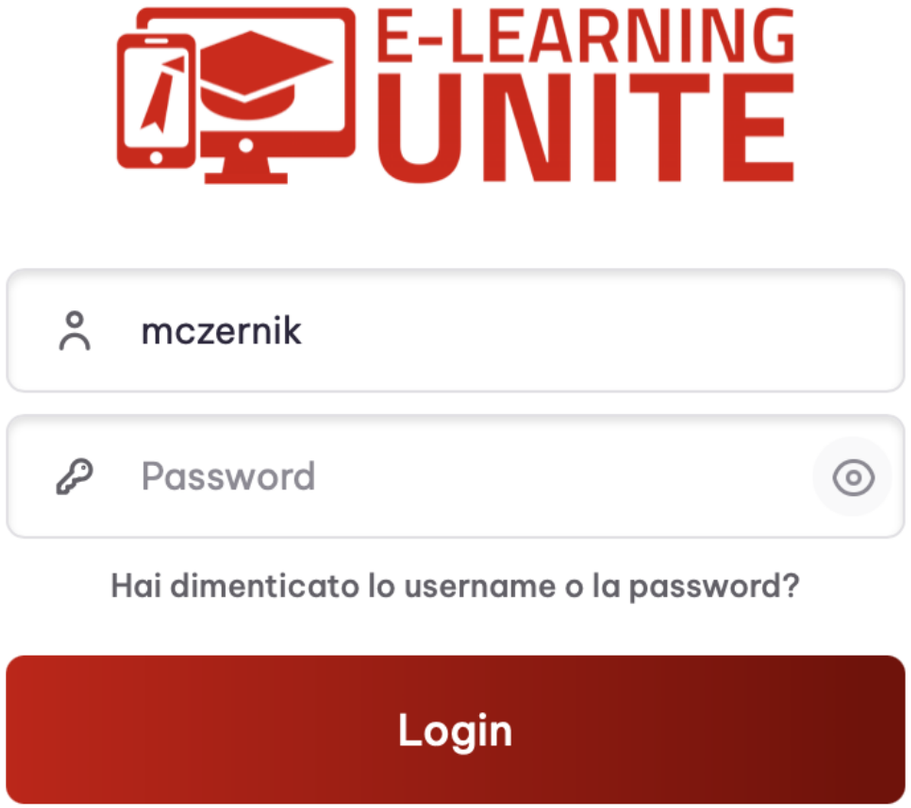
By the end of the *Cell Culture Laboratory* course:

- 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:

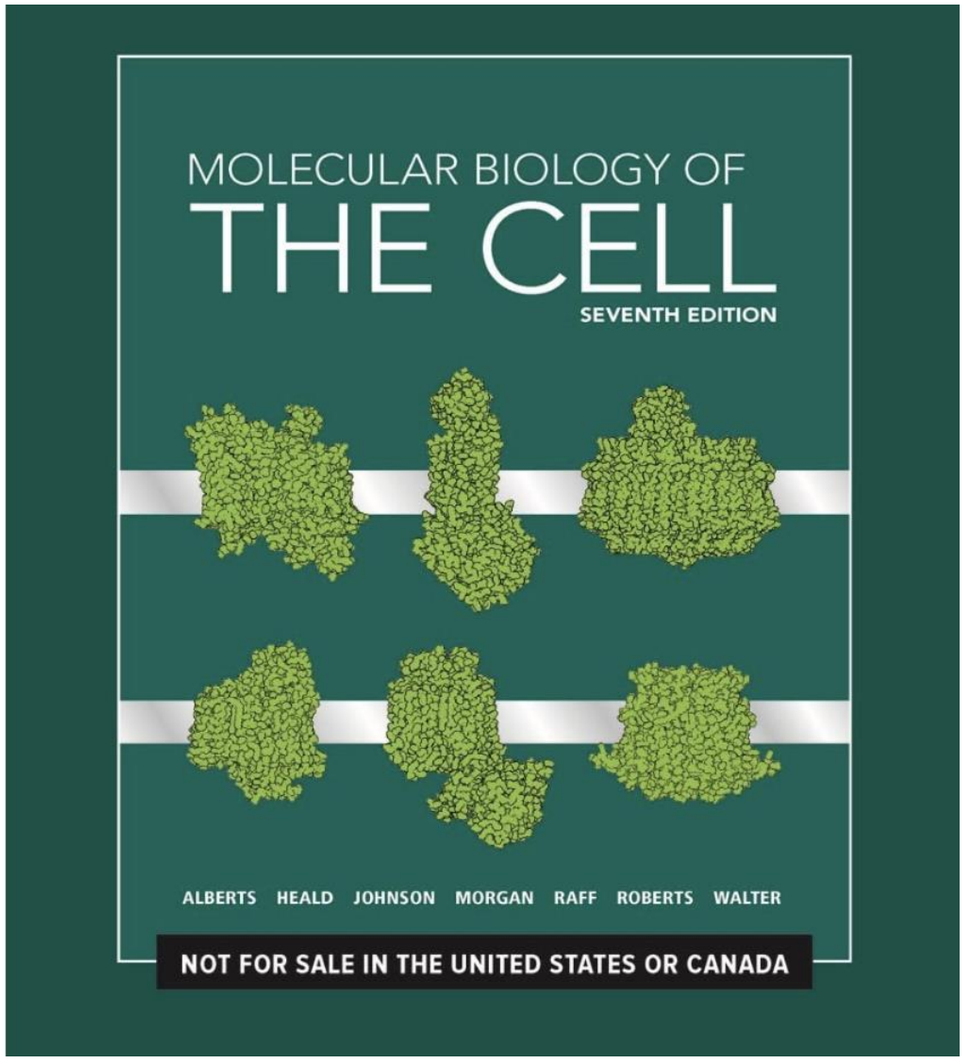
CELLULAR PHYSIOLOGY

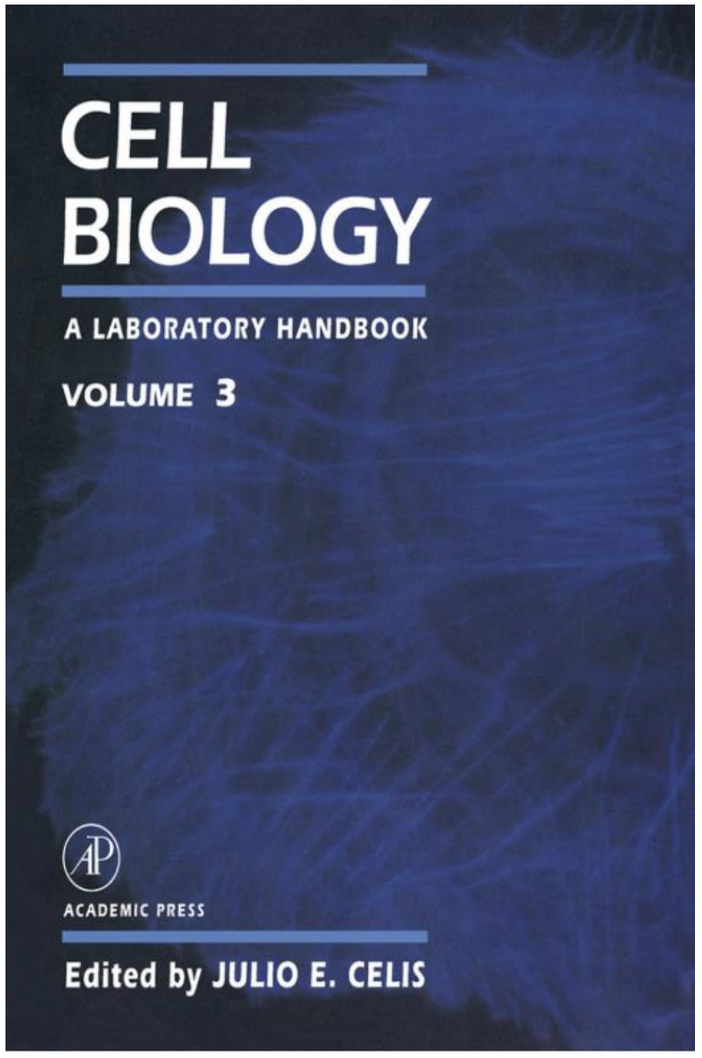
The final grade will be based on the **average of the three intermediate** tests (taken online, multiple-choice with one correct answer).
To improve the grade, it will be possible to take an oral exam (but...!!) or final total test written.

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://forms.gle/JRnqvTCzFs15EbqL8



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