Department of
Life Sciences
and Systems Biology

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Cellular and Molecular Biophysics

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CFU 5 LM Biotecnologie Industriali- 6 LM Fisica - A.A. 2024/25

Corso di laurea in LM Biotecnologie Industriali- LM Fisica

Docenti Biofisica Cellulare e Molecolare

Department of Life Sciences and Systems Biology

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4CFU per Biotec Industriali; 5CFU per Fisica

Alessandra Fiorio Pla alessandra.fiorio@unito.it (course coordinator)

Associate Professor in Physiology

Department Life Science and Systems Biology

1CFU

Tullio Genova tullio.genova@unito.it

Associate Professor in Physiology

Department Life Science and Systems Biology

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- Moodle web site for Cellular and Molecular Biophysics

https://biologia.i-learn.unito.it/course/view.php?id=1622&notifyeditingon=1

Iscrivetevi!!
Enroll!!

PROGRAM for both Industrial Biotechnology and Physic

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02.10.24 – 04.10.24: 4h
Cell membrane permeability: fluxes across the plasma membrane.
Fluxes and lows for neutral species and electrolytes
Fick
Nernst-Plank
Goldman-Hodgkin-Katz
Transporters classification

08.10.23 NO LEZIONE (PICB)

11.10.24 - 15.10.24 NO LEZIONE

17.10.24 - 18.10.24: 4h
Electrical properties of cell membranes Graded and Action Potentials. Hodgkin and Huxley model and signal propagation. Patch clamp technique

21.10.24 – 22.10.24 – 22.10.24: 6h
Ion channels: structure and function. Ion channels classification: leak channels; gated channels. Common properties of ion channels: gating and selectivity. Molecular basis of voltage sensor. Molecular basis of Voltage-gated channels inactivation. Molecular basis of ligand-gated mechanism. Molecular basis of ion selectivity.

25.10.23 29.10.24 NO LEZIONE (PICB)

08-11.24: 2h
Introduction to fluorescence and fluorophores

12.11.24 – 15.11.24 NO LEZIONE

19.11.24: 2h
Bioimaging techniques using fluorescent probes: FRET, FRAP, TIRF

22.11.24: 2h
Spatio-temporal features of calcium signaling

26.11.24 NO LEZIONE

29.11.24: 2h
Functional analyses of ion channels: fluorescent probes to measure Ca2+ signals

03.12.24: 2h
pH sensitive ion channels and role in tumor progression.

06.12.24 – 10.12.24: 4h
Mechanosensitive channels. Two examples: Piezo and TRP. **OPTIONAL for Physic students**

13.12.24: 2h
Cell volume regulation and Aquaporin. **OPTIONAL for Physic students**

20.12.24: 2h
Discussion of previously assigned paper

Prof Genova 1CFU
05.11.24 LEZIONE INTRODUTTIVA ESERCITAZIONI????

Practical courses will start at the beginning of november. Ion imaging experiment: solution preparation; cell cultures; Ca2+ imaging, data analysis.

PROGRAM for Physic = 1-2 Additional CFU

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1 CFU: Students research assay and Mini "workshops". Dates to be decided (January for mini workshop?)

Research Assay: at-home assignment referred to specific topics of the course will be prepared by groups (students) and presented orally by the end of the semester (10' exposition + 5' discussion).

1 CFU: practical work in our laboratory. To be defined.

Exam evaluation For Industrial Biotechnology students

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Examinations will be based on material covered in lectures, on site activities and assigned assays on practical activities.

- **Practical work**: students will perform specific experiments concerning selected topics presented in the lectures including data analyses. The outcome of the work will be presented in form of final report (Practical Report) that will be part of the final evaluation. Correspondence between vote to the Practical report and additional points for final exams is as follows: **22-23, 2 points; 24-25, 4 points; 26-27, 8 points; 28-30, 11 points.**
- **Final exam** – This exam will be an oral exam based on the topics presented during the course. **The maximum grade will be 20/30.** Grading 31 will give rise to " 30 cum laude"

Exam evaluation For Physic students

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Examinations will be based on material covered in lectures, on site activities and assigned assays on practical activities.

- **Practical work**: students will perform specific experiments concerning selected topics presented in the lectures including data analyses. The outcome of the work will be presented in form of final report (Practical Report) that will be part of the final evaluation. Correspondence between vote to the Practical report and additional points for final exams is as follows: **22-23, 2 points; 24-25, 4 points; 26-27, 6 points; 28-30, 8 points.**
- **Research Assay**: This at-home assignment will refer to specific topics of the course. The essay (up to 2000 words + figures, tables and references) will be prepared by groups of usually two students and presented orally by the end of the semester. The Research Essay will give rise to a **maximum of 12/30 points**.
- **Final exam** – This exam will be an oral exam based on the topics presented during the course. **The maximum grade will be 12/30**. Grading 31-32 will give rise to " 30 cum laude"

Research assays organization for Physics Students

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- **By 15.10.21:** topics proposal in moodle
- **By 30.10.21:** topic choice and group composition = by mail
- **By 15.11.21**: first meeting (30') to present the outline and work partitions within the groupwork
- **By 15.12.21:** second meeting (30') to check the work in progress
- **01.01.22:** Deadline for research assay
- **january (between 7 and 16):** Mini workshops (10'+5' discussion). Research assay: (up to 2000 characters + figures, tables and references)

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Thank you