

Description of Curricular Unit

1. **Curricular Unit:** *Trends in Microbial and Cell Biology*
2. **Curricular Unit code:** TMCB
3. **Faculty:** Instituto de Tecnologia Química e Biológica
4. **Department:** not applicable
5. **Course:** PhD in Biological and Chemical Sciences and Engineering
6. **Course level:** PhD
7. **Type of Curricular Unit:** Compulsory
8. **Year of study plan:** First year
9. **Semester:** First semester
10. **Number of credits:** 4 ECTS
11. **Coordinators:** Célia Miguel and Jaime Mota
- 12 **Number of hours/week:** minimum 45 h of total contact in semester

13. Objectives of Curricular Unit

A student enrolling in this course will become familiar with the cell biology of different biological systems. By providing a broad overview of the field, this curricular unit aims to promote the development of skills and competences allowing an integrated approach to biological questions. Different aspects of cell organization and function will be covered in both prokaryotic and eukaryotic organisms. It is expected that the student will also become familiar with the novel methodologies or tools being used in this research field (e.g. modern real-time microscopic techniques and deep sequencing).

The course is organized into two different components. Students will attend lectures aimed to empower them with fundamental concepts of biological processes ubiquitous to every cell: cellular organization, transcription and stability of mRNA, chromosome dynamics, regulation of metabolic processes, organization and regulation of the cell cycle.

Additionally, the student will be given the opportunity to tune the course to topics of her/his interest through the attendance of a minimum of two tutorials under the guidance of ITQB researchers that are specialists in different areas of microbial and cell biology. The number of students per tutor will permit the tutorial to be adapted to the background and goals of each student.

14. Background requirements

None.

15. Content of Curricular Unit

Lectures: Basic organization of the eukaryotic cell; Light Microscopy in Cell Biology; 3D Live Cell Imaging; Imaging with microscopy - recent methods to increase resolution; Microarrays and deep sequencing; Bacterial Cell Division; Bacterial

Transcription Initiation; Chromatin and Epigenetics; Metabolic networks and integration of metabolism; Signaling in bacterial communities; Host-bacteria interactions; Yeast as a model system; Flower development; Developmental Biology in animal models; Control of gene expression: the central role of RNA; Telomeres and Cancer.

Tutorials: Several topics in microbial and cell biology including basic features of prokaryotic and eukaryotic cell function and organization, development in different biological systems, among others.

16. Bibliography

Molecular Biology of the Cell by Bruce Alberts (Author), Alexander Johnson (Author), Julian Lewis (Author), Martin Raff (Author), Keith Roberts (Author), Peter Walter (Author)

Garland Science; 5 edition (2008) 1268 pages **ISBN-10:** 0815341059

Molecular Cell Biology by Harvey Lodish (Author), Arnold Berk (Author), Chris A. Kaiser (Author), Monty Krieger (Author), Matthew P. Scott (Author), Anthony Bretscher (Author), Hidde Ploegh (Author), Paul Matsudaira (Author) W. H. Freeman; Sixth Edition edition (2007) 973 pages **ISBN-10:** 0716776014

Developmental Biology by Scott F. Gilbert (Author) Sinauer Associates Inc.; 8 th edition (2006) 785 pages **ISBN-10:** 087893250X

Bacterial Pathogenesis: A Molecular Approach
by Abigail A. Salyers (Author), Dixie D. Whitt (Author)
ASM (1994) 448 pages **ISBN-10:** 1555810705

Cellular Microbiology by Pascale Cossart (Editor), Patrice Boquet (Editor), Staffan Normark (Editor), Rino Rappuoli (Editor), Steffan Normark (Author) American Society Microbiology 2nd ed (2004) 636 pages **ISBN-10:** 155581302X

17. Teaching methodology

The TMCB unit includes the attendance of lectures and tutorial sessions. The students are invited to select two of the proposed tutorials and study the subjects, as well as discuss them, under the close guidance of the tutor.

18. Evaluation

The evaluation will have three components: a written component (35%) consisting in a two-page project proposal aiming at a scientific question related with this curricular unit; the oral presentation of the project proposal (35%); tutorials (30%).

19. Language

English.