Description of curricular units

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 Sérgio Raposo Filipe

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 (ex. modern real-time microscopic techniques, etc).
The course is organized into two different components. In the first week, students will attend lectures aimed to empower them with fundamental concepts of biological processes ubiquitous to every cell: DNA replication and chromosome dynamics, transcription and stability of mRNA, protein synthesis and 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. Frequency requirements
None.

15. Content of Curricular Unit

Lectures: Introduction to Molecular Biology; Basic organization of the eukaryotic cell ; Light Microscopy in Cell Biology; 3D Live Cell Imaging; The complementary use of Electron Microscopy in the age of live imaging and molecular constructs;

Replication of DNA; Bacterial Transcription Initiation; Microarrays and deep sequencing as tools to decipher biological processes; Control of gene expression: the central role of RNA; Metabolic networks and integration of metabolism ; Bacterial Cell Division ; Cellular Organization of Genome Function ; Telomeres and Cancer; Yeast as a model system ; Fungal biodiversity

Tutorials: Several topics in microbial and cell biology including basic features of prokaryotic and eukaryotic cell function and organization, host-bacteria interactions, 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 a written component (50%) consisting in a two-page project proposal aiming at a scientific question related with this curricular unit; the other evaluation component will be based on the oral presentation of the project proposal (50%).

19. Language

English