

MASTER DEGREE IN MICROBIOLOGY



MOLECULAR AND CELLULAR MICROBIOLOGY – Instituto Superior Técnico

Objectives:

This discipline develops an integrative scientific perspective of systems biology, with emphasis on the complexity of microbial responses to environmental and/or genetic changes, aiming the exploitation of the potential use of microorganisms and the control of their adverse effects, with impact in Biotechnology, Environment and Health.

Program:

1. Mechanisms of gene and genomic regulation in prokaryotes: i) 2-component systems, ii) alternative sigma factors, iii) quorum-sensing, and iv) small non-coding RNA molecules.
2. Adaptive responses to environmental changes and stress in prokaryotes.
3. Mechanisms of interaction between plants and microbes and of bacterial infection in humans.
4. Gene and genomic regulation in eukaryotes. Epigenetic mechanisms of transcriptional regulation. Splicing and alternative splicing. Complex networks of transcriptional regulation.
5. Organelles and membrane systems. Mechanisms of solute transport. Intracellular membrane protein trafficking and protein turnover mechanisms.
6. Genome-wide response to stress and multiple drug resistance in eukaryotes. Autophagy. Apoptosis. Multiple drug resistance: definition, regulators and underlying biological processes.
7. Presentation and discussion of scientific articles by the students.

Evaluation methodology:

Teaching methodologies include lectures and student presentations. The final grade results from the balance between the contributions of two evaluation elements:

- 1 – Final Exam - 70% - The exam is mandatory. A minimal grade of 9,5 values is required.
- 2 –Article presentation - 30% - The detailed presentation of a research article will be evaluated in class. This work will be carried out as groups of 3 students. Student presence during these classes is mandatory.

Recommended bibliography:

- * Biology of Prokaryotes , J.W. Lengeler, G. Drews, H.G. Shlegel , 1999 , Blackwell Science, New York.
- * Molecular Biology of the Cell, B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts, J.D. Watson, 1983, Garland Publishing, Inc, New York & London.
- * Biologia Celular e Molecular, C. Azevedo, C.E. Sunkel, 2012, LIDEL – Edições Técnicas, Lisboa.