

**Code: 1715 Microbiology****Degree:** 1<sup>st</sup> cycle - Biology**Curricular Year:** 1<sup>st</sup>**Semester Course:** 1<sup>st</sup>**Credits:** 6 ECTS**Compulsory****Language:** Portuguese/English**Responsible:** Adília Neves Pires de Oliveira**Other lecturer(s):** Maria Elisa Ferreira da Silva Pampulha**Web Site:** <http://www.isa.utl.pt/home/node/3945>**1. Contact hours:**

Lectures 42 Practicals/Laboratory 28 Others 14 Total 84

**2. Objectives:**

To learn the major concepts, principles and applications of microbiology. To learn about the metabolism, evolution and ecology of microorganisms. To explore microbial diversity. To understand microbial functioning and stress response. To perform laboratory skills and work safely in the laboratory.

**3. Programme:****Introduction to Microbiology**

The story and scope of microbiology.

**Microscopy.**

Light microscopy, Basic operating principles. The microscopic measurement of microorganisms.

**Microbial Evolution.**

Microbial phylogeny derived from ribosomal DNA sequences. Characteristics of the Domains of Life.

**The Diversity of Microbial World**

Prokaryotic and Eukaryotic diversity. Prokaryotic cell structure and function. General properties of viruses and features of virus replication. Sub-viral particles. Microscopic examination of fresh and stained cells.

**Cultivation of Microorganisms**

Nutritional and physical requirements of microbial populations. Nutritional types of microorganisms. Culture media. Isolation of pure cultures.

**Control of Microorganisms by Physical and Chemical Agents**

The pattern of microbial death. The use of physical methods and chemical agents in control. The conditions influencing the effectiveness of antimicrobial agent activity. Evaluation of antimicrobial agent effectiveness.

**Microbial Growth**

Key molecular processes that occur when a cell grows and divides. What proteins assist in cell division process. Dynamics of growth in microbial populations. The concept and the mathematics of exponential growth.

**Principles of Microbial Bioenergetic**

The biochemical processes behind the metabolic diversity in microbial life. Metabolic diversity and microbial ecology. The chemotrophic and phototrophic bioenergetic processes. The anaerobic way of life: anaerobic respirations, fermentations and syntrophy. Molecular oxygen as reactant in biochemical processes. The use of API biochemical system for the identification of bacteria.

**Microbial Ecology**Microorganisms in fresh water and terrestrial environments. Microbial interactions. Growth limitation by environmental factors. *Quorum sensing* and microbial populations. Extreme environments.**4. Bibliography:****Main Bibliography**

"Brock Biology of Microorganisms"

Madigan, M.T., et al 2009 12<sup>a</sup> Edição, Pearson International Edition

"Manual de Microbiologia".

A.Oliveira &amp; M. E. Pampulha 2010, Edição A.E.A

**Other Bibliography**

"Microbiology"

Prescott, L. M. et al 2005, 6ª Edição, McGraw-Hill, International Edition

Biologia Microbiana

Lopes, M. A. & Fonseca, A. 1996. Universidade Aberta

**5. Assessment:**

Students have to participate in all classes, with a tolerance of two . Tests, report and an oral presentation are required for the continuous evaluation. Students that get a score of 12 (out of 20) do not need to do the final examination. When they do not get that mark, they will have to perform an examination at the end of the Credit Unity. In this case continuous evaluation mark will count as 40% of the final mark, and the exam as 60%. Final exam will take place at the end of the semester and students can also use the exam to improve their marks.

6. Estimated Workload: 

168
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 Hours

7. Last Update: 

8/7/2010
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