

General microbiology (IInd Year of study, IIIrd SEMESTER)

Credit value (ECTS) 5

Course category

Domain (Imposed)

Course holder:

Assoc. Prof. PhD. Florin-Daniel LIPȘA

Discipline objectives (course and practical works)

The aim of the course is to have students acquire knowledge on taxonomic descriptions, morphological characters and physiological behavior of the main groups of microorganisms that have practical implications. Students will also study the physico-chemical and biological development of microorganisms and metabolic behavior based on physiological particularities and growth conditions.

Practical training will familiarize students with technical work in microbiology laboratories and knowledge of general notions relating to taxonomy, morphology, physiology and reproductive particularities of the main groups of microorganisms with implications in food science and biotechnology.

Contents (syllabus)

Course (chapters/subchapters)
The object of study, the history and the importance of microbiology.
Prions.
Viruses: definition and general particularities; nature and origin of viruses; overall structure of the virus; classification, cultivation and identification of viruses; multiplication of viruses: the relationship virus - host cell; bacteriophages, cyanophages, micoviruses, viroids.
Bacteria: nomenclature, taxonomy, morphology, size, cell structure, chemical composition of bacterial cell, energy metabolism, respiration, nutrition, growth and multiplication. Particular groups of bacteria.
Diatoms: morphology, anatomy, nutrition, breeding and taxonomy.
Protozoa: morphology, anatomy, nutrition, breeding and taxonomy.
Fungi: morphology, anatomy, nutrition, breeding and taxonomy.
Ecological interrelationships between organisms: interrelations between populations of soil microorganisms: methabiosis, antagonism and symbiosis; Interrelations between soil microorganisms and higher plants: spermatosphere, rhizosphere; Mycorrhiza; Interrelations between fungi and plants in the case of mycorrhiza.
The role of microorganisms in achieving biological circuits in nature (Nitrogen cycle, Carbon cycle).
The role of microorganisms in depollution and environmental protection. Microbial biodegradation and biodeterioration. The influence of xenobiotics substances on microorganisms.
Factors that condition the development and physiological activity of microorganisms: extrinsic factors; intrinsic factors; default factors (biological).

Obtaining and development control of microorganism cultures: pure cultures, ways of cultivation; stages of development of microorganisms in discontinuous and asynchronous cultures.

Microbial metabolism: definition; metabolic pathways; types of metabolism; practical implications metabolic processes (mechanism, starter cultures, practical implications).

Practicum

The presentation of the General Microbiology laboratory; work safety rules; Laboratory equipment and utensils; good practice working in microbiology.

Optical microscope Leica DM500. Microscopic measurements.

Sterilization: Sterilization methods in microbiology, sterilization by physical and chemical agents.

The technique of cultivation of microorganisms: Seeding with a Pasteur pipette, with a loop, and seeding in Petri dishes.

The conduct of microscopic examination: examination of blade-slide preparations, in suspended drop; technical execution of a smear.

Morphology of bacteria: colorful preparations examination after simple coloration technique; Gram coloration.

The morphology of fungi: examination of blade-slide preparations or in suspended drop.

Methods of evaluating the number of microorganisms: indirect and direct methods of counting.

Pure culture: Methods for obtaining and preservation techniques.

Final colloquium of knowledge evaluation

References

1. Apostu S. - *Microbiologia produselor alimentare*, vol. I, II și III, Editura Rispoprint, Cluj-Napoca, 2006.
2. Ulea E., **Lipșa F.D.** - *Microbiologie*, Ed. Ion Ionescu de la Brad, Iași, 2011.
3. Ulea E., **Lipșa F.D.** - *Îndrumător practic de microbiologie*, Ed. Ion Ionescu de la Brad, Iași, 2012.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Oral examination	60%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	40%

Contact

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