Microbiologie (Ist Year of study, IInd SEMESTER)

Credit value (ECTS) 4

Course category
Optional courses (to choose)

Discipline Code: A.EMIAIA.F.115

Course holder:
PhD, Lect. Andrei-Mihai GAFENCU

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 works seek to 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 agriculture and agriculture microbiology.

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.
Soil Microbiology: role of microorganisms in the formation and evolution of organic matter; Microbiological theory of the formation of humus; various microbial activity of soils; soil microbial profile.
Influence of ecological factors on microorganisms: effect of pH; influence of temperature; influence of water; the influence of radiant energy; influence the mineralogical composition of the soil.
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: biological nitrogen fixation, ammonification, nitrification, denitrification. - Carbon cycle: the degradation of carbohydrates, hemicelluloses, starch, pectin, cellulose and lignin. - The contribution of microorganisms to achieve biological circuits of sulfur, phosphorus, potassium, calcium, iron and manganese. - Circuit of biological trace elements.

Practical works
Presentation of the General Microbiology Laboratory; labor protection rules; laboratory devices and utensils; correct working practices in the microbiology laboratory. Optical microscope Leica DM500. Microscopic measurements. Sterilization: Methods of sterilization in microbiology; sterilization by physical and chemical agents. Microorganism cultivation techniques: inoculation with a Pasteur pipette, with a loop, by stabbing, inoculation in Petri dishes. Conduct of microscopic examination: examination in slide-cover slip preparations, in hanging drop; technique for making a smear. Bacterial morphology: examination in stained preparations using the simple staining technique; Gram staining. Fungal morphology: examination in slide-cover slip preparations or in hanging drop. Determination of the number of microorganisms per gram of soil. Examination of free-living nitrogen-fixing bacteria, aerobic and anaerobic. Examination of symbiotic nitrogen-fixing bacteria. Examination of cellulolytic microorganisms. Final colloquium to verify knowledge.

References

1. Gafencu A.M.,Ulea E. – *Îndrumător practic de microbiologie generală*. Ed. Ion Ionescu de la Brad, Iași, 2023.
2. Ulea E., Lipşa F.D. – *Îndrumător practic de microbiologie*. Ed. Ion Ionescu de la Brad, Iaşi, 2012.
3. Ulea E., Lipşa F.D. – *Microbiologie*. Ed. Ion Ionescu de la Brad, Iaşi, 2011.

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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