

## Microbiology (IInd Year of study, IIIrd SEMESTER)

Credit value (ECTS) 2

### Course category

Domain (Imposed)

### Course holder:

Assoc. Prof. Dr. Florin-Daniel LIP A

### 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 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 food science and biotechnology.

### Contents (syllabus)

Course (chapters/subchapters)
<b>The object of study, the history and the importance of microbiology.</b> Characteristics of the five kingdoms - cellular structures.
<b>Soil Microbiology:</b> 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.
<b>Taxonomy, morphology, physiology, ecology and the role of soil microbiota</b> (viruses, bacteria, diatoms, protozoa, fungi).
<b>Ecological interrelationships between organisms:</b> 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.
<b>The role of microorganisms in achieving biological circuits in nature</b> (Nitrogen cycle, Carbon cycle).
<b>The role of microorganisms in depoluation and environmental protection. Microbial biodegradation and biodeterioration. The influence of xenobiotics substances on microorganisms.</b>

Practicum
<b>The presentation of the General Microbiology laboratory;</b> work safety rules; Laboratory equipment and utensils; good practice working in microbiology.
<b>Optical microscope Leica DM500</b> Microscopic measurements.

<b>Sterilization:</b> Sterilization methods in microbiology, sterilization by physical and chemical agents.
<b>The technique of cultivation of microorganisms:</b> Seeding with a Pasteur pipette, with a loop, and seeding in Petri dishes.
<b>The conduct of microscopic examination:</b> examination of blade-slide preparations, in suspended drop; technical execution of a smear.
<b>Morphology of bacteria:</b> colorful preparations examination after simple coloration technique; Gram coloration.
<b>Morphology of fungi:</b> examination of blade-slide preparations or in suspended drop.
<b>Examining of aerobic and anaerobic free nitrogen fixing bacteria</b>
<b>Examining of molecular nitrogen symbiotic fixing bacteria</b>
<b>Final colloquium of knowledge evaluation</b>

### References

1. Malschi Dana, 2009. *Elemente de biologie, ecofiziologie si microbiologie.(Biocenologie terestra. Biologia solului. Hidrobiologie. Ecosisteme antropizate.)* Note de curs si aplicatii practice, Manual in format electronic. Facultatea de Stiinta Mediului, Universitatea Babeș-Bolyai. Editura Bioflux, Cluj-Napoca. <http://www.editura.bioflux.com.ro/carti-2009/>
2. Pamfil D., - *Microbiologie*, Editura Genesis, Cluj-Napoca, 1999.
3. Papacostea P. - *Biologia solului*. Ed. tiin ific i Enciclopedic , Bucure ti, 1976.
4. Ulea E., Lip a F.D. - *Îndrum tor practic de microbiologie*, Ed. Ion Ionescu de la Brad, Ia i, 2012.
5. Lip a F.D., Ulea E. – *Practicum de microbiologie alimentara*, Editura Ion Ionescu de la Brad, 2018.
6. Ulea E., Lip a F.D. - *Microbiologie*, Ed. Ion Ionescu de la Brad, Ia i, 2011.
7. Zarnea Gh. - *Tratat de microbiologie general* , Ed. Academiei Române, Bucure ti, Vol. I - 1983, Vol. II - 1984, Vol. III - 1986, Vol. IV - 1990, Vol. V – 1994.
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### 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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