

ENV-412

Microbial ecology

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Cursus	Sem.	Type
Environmental Sciences and Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Lecture	2 weekly
Project	2 weekly
Number of positions	

Summary

The course will focus on fundamental concepts of microbial ecology and environmental microbiology, with emphasis on bacteria and archaea, although fungi, algae, and protists will also be covered.

Content

The course will explore the ecological factors that shape microbiomes, the essential roles microorganisms play in maintaining ecosystem functions, and their applications in environmental management and biotechnology. The course will also explore the interactions between microorganisms and their environments, encompassing both aquatic and terrestrial ecosystems, as well as their associations with plants and animals.

Additionally, it will cover the microbial diversity and adaptation strategies in extreme environments characterized by extreme temperatures, acidity, radiation, salinity, and osmotic pressure.

Students will gain theoretical knowledge of microbial ecology and environmental microbiology, including the factors shaping microbiomes and the roles of microorganisms in ecosystem functioning. They will be able to apply practical skills in microbiome studies and molecular methods for investigating environmental microbiology and microbial ecology.

Keywords

microbiology, ecology, environmental microbiology

Learning Prerequisites**Required courses**

For Master students: ENV-202 Microbiology for engineers or BIO-372 Microbiology. Or equivalent background if coming in from another university.

For PhD students: background in microbiology, biology, or ecology.

Learning Outcomes**Transversal skills**

- Make an oral presentation.
- Communicate effectively, being understood, including across different languages and cultures.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.

Teaching methods

Lecture, wet lab, dry lab, fieldwork

Expected student activities

Expected activities will include **practical exercises including field-work, laboratory molecular techniques, and data analysis** commonly used in environmental microbiology research and analysis of microbiome data. Students will participate in discussions and collaborative activities that explore real-world applications of microbial ecology and environmental microbiology in fields such as biotechnology and environmental management. Students will examine and present case studies in applied microbial ecology.

Assessment methods

25% presentation

25% report

50% exam

Supervision

Office hours Yes

Assistants Yes

Forum Yes

Resources

Moodle Link

- <https://go.epfl.ch/ENV-412>