OCES 4201 Environmental Microbiology

3 Credits

Course Instructor

Stanley Lau, Department of Ocean Science, Rm CYT 5005, scklau@ust.hk

Office hours

By appointment

Course objectives

The course aims to introduce the students to (i) the fundamental features of microorganisms that live in the natural environment, (ii) the roles of microorganisms in natural processes that shape our ecosystem, and (iii) the use of microorganisms in environmental technology. Key concepts are illustrated using real-life examples and case studies.

Intended Learning outcomes

Upon completion of this course, students will be able to:

- Appreciate the vast diversity of microorganisms living in the natural environment
- Understand the relationship between environmental conditions and the genetic, functional, and morphological diversity of microorganisms
- Recognize the key ecological processes driven by environmental microorganisms
- Explain the microbiological principles underlying several environmental technologies

Major References

Environmental microbiology: fundamentals and applications
https://lbdiscover.ust.hk/bib/991008133149703412

Microbial ecology
https://lbdiscover.ust.hk/bib/991012623430303412

Course Assessment

Continuous assessment - 6 quizzes (15 % each, 90 % in total)
Class participation (10 %)

Course outline

Lecture Topic
Course Introduction Introduction to Environmental Microbiology (Lecture 1 ppt)
Evolution of life (Lecture 2 ppt)
Classification of prokaryotes (Lecture 3 ppt)
Biogeography of microbes (Lecture 4 ppt)
Test on Canvas and review of answers
Functions of prokaryotic cell structure in relation to survival in the environment (I) (Lecture 5 ppt)
Functions of prokaryotic cell structure in relation to survival in the environment (II) (Lecture 5 ppt)
Bacterial growth and physiology (I) (Lecture 6 ppt)
Test on Canvas and review of answers
Bacterial growth and physiology (II) (Lecture 6 ppt)
Bacterial metabolism and biogeochemical cycling (I) (Lecture 7 ppt)
Bacterial metabolism and biogeochemical cycling (II) (Lecture 7 ppt)
Test on Canvas and review of answers
Socioeconomic importance of biogeochemical cycles (I) (Lecture 8 ppt)
Socioeconomic importance of biogeochemical cycles (II) (Lecture 8 ppt)
Socioeconomic importance of biogeochemical cycles (III) (Lecture 8 ppt)
Test on Canvas and review of answers
Microbe-microbe interactions: antibiotics (I) (Lecture 9 ppt)
Microbe-microbe interactions: antibiotics (II) (Lecture 9 ppt)
Microbe-microbe interactions: antibiotics (III) (Lecture 9 ppt)
Test on Canvas and review of answers
Microbe-microbe interactions: antibiotics (IV) (Lecture 9 ppt)
Microbe-microbe interactions: biofilms and quorum sensing (I) (Lecture 10 ppt)
Microbe-microbe interactions: biofilms and quorum sensing (II) (Lecture 10 ppt)
Test on Canvas and review of answers