האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

THE PLANT MICROBIOME - 71153

Last update 14-08-2018

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: Agroecology & Plant Health

Academic year: 0

Semester: 1st Semester

Teaching Languages: English

Campus: Rehovot

Course/Module Coordinator: Dr. Nadav Kashtan

Coordinator Email: Nadav.kashtan@mail.huji.ac.il

Coordinator Office Hours: Appointments should be coordinated by email

Teaching Staff:

Dr. Nadav Kashtan

Course/Module description:

An average plant harbors more than trillion microbes that live on its surfaces and within its internal tissues. Who are these microbes? What are they doing? How do these microbes affect plant health, development and growth? What principles govern the ecology of plant- associated microbes? How does life look like from the point of view of a bacterium on the leaf surface?
The course will try to provide some answers to the above questions based on systems biology approaches. The course will focus on bacteria - the most abundant microorganisms associated with plants. Fungi will be included but to a much lesser extent. A central theme in the course is the ecology of micro-organisms in the plant environment including plant leaf surfaces (phyllosphere) and the root environment (rhizosphere).

Course/Module aims:

The course aims to provide a scientific background on the plant microbiome and to present a general perspective of the ecology of microbes in the plant environment. In addition it aims to teach the students how interdisciplinary approaches can be utilized to advance research of the plant microbiome.

Learning outcomes - On successful completion of this module, students should be able to:

- Demonstrate a deep knowledge base in microbial ecology of plant microbiome and in the diverse advanced techniques of research in the field.
- Define open/new questions in plant microbiome research.
- Use systems biology approaches to design and apply integrative plant microbiome research.

Attendance requirements(%):

90%

Teaching arrangement and method of instruction: Lectures + students' presentations of their projects

Course/Module Content:

1. Introduction to the Plant Microbiome.
2. New techniques and methods to study the plant microbiome: Genomics,

Microscopy, Synthetic Ecology, Microscale bio-sensors, Computer simulations and modeling.
3. Environmental and global aspects of plant microbiomes: the "openness" of the phyllosphere and rhizosphere as ecosystems, and their interactions with the atmosphere and soil ecosystems; global biogeochemical cycles; global warming and climate change; health related issues (e.g. human pathogens on leafy greens).
4. Using microscopy, genomics and modeling to study microbial ecology of the Phyllosphere.
5. Using microscopy, genomics and modeling to study microbial ecology of the Rhizosphere.
6. Bridging the gap between fluid mechanics and microbial ecology: the interplay between the hydration conditions on plant surfaces and bacterial colonization.
7. Plant-microbe interactions and communication: synthetic ecology approaches.
8. Plant microbiota interactions between bacterial species, interaction between bacteria and insects, protozoa and viruses: combining experiments and modeling.
9. Systems understanding of plant phytopathology: population dynamics from the micro to landscape scales.
10. Systems understanding of bio-control based on microscopy, genomics and modeling.

Required Reading:
The course will require reading of 1-2 research articles before each class.

Additional Reading Material:

Course/Module evaluation:
End of year written/oral examination 0 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 70 %
Assignments 0 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 30 %
Peer Review and Participation

Additional information: