

QBio101: Network of Life

Module Responsible:

Prof. Dr. Eva Nowack

Version:

02/01/2021

Module Organizer:

Prof. Dr. Eva Nowack

Type:

Compulsory

Lecturer:

Prof. Dr. Eva Nowack, Dr. Ovidiu Popa

Total Working Time

180 h

Credit Points

6 CP

Contact Time

60 h

Self Study

120 h

Duration

1 Semester

Course Components

Lecture: 2 SWS

Exercise: 2 SWS

Group Size

P: 40

P: 40

Frequency

Every Winter Semester

Learning Competencies:

The students have acquired the basic knowledge of the reticulated processes of life evolution. They learned how life may have evolved from inorganic matter and how geo-chemical/physical processes impacts evolutionary routes which resulted in the diversification of life. The students gained basic insights into the connectivity of underlying mechanisms that shapes prokaryotic and eukaryotic life. In addition, they are able to rudimentary describe diversity and reconstruct phylogenetic relationship between different phyla.

After completing the exercises, students are experienced to

- search information on a topic of interest and evaluate the information source.
- divide a scientific question in testable hypotheses.
- present and discuss scientific results.
- apply basic techniques to describe phylogenetic relationships and group affiliation.

Content:

In the "Network of Life" module, students get an overview of the central molecules and elements of life. They learn about the origin of life from inorganic matter and how evolution resulted in the diversification of life. Over the course of the module, students get to know central concepts in evolution such as biological information, genes and inheritance, mutation and variation, horizontal gene transfer and endosymbiosis and they compare different theories of evolution. Using the Tree of Life, the students learn about the complexity and interconnectedness of life and the systematics of selected taxonomic groups.

- Building Blocks of Life
 - Nucleic Acids
 - Proteins
 - Lipids
 - Energy
 - Membranes
 - Metals and Cofactors

- Conditions and Origin of Life
 - RNA World
 - Black Smoker
 - Clay and Lipids
 - Wet and Dry Cycles
- Basics of Ecology
- Biological Information
 - Schrödinger
 - Muller
- Genes and Inheritance
 - Darwin and Lamarck
 - Dellbrück-Luria
 - Watson-Crick
- Mutations and Variations
 - History of Life on Earth
 - LUCA
 - Great Oxidation Event
 - Cyanobacteria
 - Geochemical Changes on Earth
 - Earth, Moon and Time
 - Important Events on History of Life of Earth
- Natural selection
- Phylogeny
- Viruses
- Prokaryotes
 - Bacteria
 - Archaea
- Horizontal Gene Transfer
- Endosymbiosis
 - Mitochondria
 - Chloroplasts
 - Multiple Endosymbiosis
- Origin of the cell nucleus
 - Gene Transfer to Nucleus
- Eukaryotes
 - Protists
 - Single Celled Eukaryotes
 - Diversity of protists
 - Fungi and Animals
 - Multiple Cells
 - Systematics
 - Main Differences Between Groups
 - Algae, Moss, and Plants
 - Multiple Cells
 - Systematics
 - Main Differences Between Groups

Conditions of Participation:

Enrolled in Quantitative Biology

Examination:

Written exam about the content of the lectures

Exercises throughout the module

Prerequisites for Awarding Credits for this Module:

Passed written exam and successful completion of exercises.

Factor for the Overall Grade:

The grade is weighted according to the credit points (CP) in the overall grade.

Language:

English

Literature:

Campbell 12th edition

Further Information: