BIO-109

Introduction to life sciences (for IC)

Constam Daniel, Jeschek Markus, Yang Aerin

Cursus	Sem.	Type
Communication systems	BA4	Opt.
Computer science	BA4	Opt.

Language of teaching	English
Credits	6
Session	Summer
Semester	Spring
Exam	Written
Workload	180h
Weeks	14
Hours	**6 weekly**
Courses	4 weekly
Exercises	2 weekly
Number of positions	

Summary

Introduction to Life Sciences provides snapshots of representative fields in modern biology, many of which nowadays heavily rely on computational methods.

Content

The goal of this course is to learn concepts and the vocabulary of biologists in fundamental fields at an introductory level. Rather than teaching bioinformatics, the course aims to spark curiosity about living systems and challenges in the life sciences where computer scientists are needed to develop solutions. Specific topics will include:

- Central dogma of molecular biology
- Tree of life
- Single cell organisms
- Cell biology
- Cell cycle
- Genetics
- Genome regulation
- Tissues and organs
- Cell signaling
- Developmental biology and stem cells
- Protein technologies
- Immunology
- Cancer

Keywords

Genes, Genomes, Inheritance, Evolution, Prokaryotes, Eukaryotes, Tissue Engineering, Biotechnology, Biomedical Research, Bioengineering, Synthetic Biology, Immunology, Protein Engineering

Learning Prerequisites

Required courses

None.

Important concepts to start the course

Basic notions in chemistry and biology (high school level).

Learning Outcomes

By the end of the course, the student must be able to:

- Explain fundamental concepts and terminology in modern life sciences
- Describe how biological information is stored, expressed, regulated, and inherited
- Distinguish biological structures and processes across molecular, cellular, and organismal levels
- Assess / Evaluate basic principles underlying evolution, development, immunity, and disease
- Propose representative experimental and computational approaches used in life sciences

Transversal skills

- Use a work methodology appropriate to the task.
- Communicate effectively with professionals from other disciplines.
- Take responsibility for environmental impacts of her/ his actions and decisions.
- Access and evaluate appropriate sources of information.
- Summarize an article or a technical report.

Teaching methods

The course will use a mixture of lectures, reverse classroom teaching, and self-study of specific accompanying assignments. Lectures will not be pre-recorded except if students have to use them as background material for self-study or in advance of a reverse classroom session. Teaching formats may vary depending on the topic and instructor. Exercises will vary in type, but generally include exam-like multiple choice questions, as well as group discussions on these and other quizzes, and/or on reading materials.

Expected student activities

Regular presence during the entire semester, note taking, and active participation during lectures and exercises will be necessary to achieve the learning objectives and for in-depth discussions of homework materials.
Self study will include some essential reading assignments that will be marked as such.

Assessment methods

Written exam (no open book).

Resources

Notes/Handbook

- Lecture slides in PDF format.
- All accompanying materials for self-study and reading assignments will be provided on Moodle.

Moodle Link

- https://go.epfl.ch/BIO-109