

BIO-512

Digital epidemiology

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Cursus	Sem.	Type
Computational and Quantitative Biology		Opt.
Computational biology minor	E	Opt.
Life Sciences Engineering	MA2, MA4	Opt.
Minor in life sciences engineering	E	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

Epidemiology is foundational to medicine and public health. This course starts with the key principles of classical epidemiology, progressing through computational modeling techniques, and concluding with the digital approaches of today. Students will also develop a digital epidemiology prototype.

Content

Digital epidemiology is an incredibly active field, both practically and academically, and it will grow alongside the general growth of technology adoption worldwide - in other words, massively and rapidly in the coming years and decades. However, one cannot understand digital epidemiology without understanding basic epidemiology. That's why the course teaches both the foundations of epidemiology, as well as modern computational and digital approaches to epidemiology. It is designed to introduce the learner to modern epidemiology, and to give an overview of the field, including its most recent and exciting developments.

Students will engage with topics such as:

- Core principles of epidemiology
- Testing and diagnostics
- An overview of epidemiological study types
- Insights into infectious disease dynamics
- Construction and understanding of infectious disease models
- The role and structure of network models
- Advancements in digital health monitoring
- Digital contact tracing
- The role and development of digital cohorts
- Privacy and ethics

Moreover, an emphasis is placed on applied learning. Students will be tasked with a hands-on project, giving them the opportunity to develop a prototype of a digital epidemiology application.

Keywords

Epidemiology
Digital
Public Health
Infectious Diseases
Cohorts

Learning Prerequisites

Important concepts to start the course

This is an introductory course based on first principles. Any Master or PhD student at EPFL will have the necessary prerequisites (some programming, basic biology, etc.).

Teaching methods

Ex cathedra; discussion of relevant publications; exercises; project

Expected student activities

Participating students are expected to engage in this course by attending lectures, reading additional material, understanding and presenting recent state-of-the-art publications, and completing exercises. In the second half of the course, student will engage in the development of a project by building a digital epidemiology prototype.

Assessment methods

Written exam held at mid-semester. Evaluation of project and presentation.

Resources**Notes/Handbook**

Book Digital Epidemiology

Moodle Link

- <https://go.epfl.ch/BIO-512>