

*Course syllabus*

# Biological Systems Biologiska system

**EXTQ20, 7.5 credits, A (Second Cycle)**

**Valid for:** 2025/26

**Faculty:** Faculty of Engineering LTH

**Decided by:** PLED W

**Date of Decision:** 2025-04-09

**Effective:** 2025-05-05

## General Information

**Main field:** Technology **Depth of study relative to the degree requirements:** Second cycle, in-depth level of the course cannot be classified

**Elective for:** BME5-sbh, Pi4-biek

**Language of instruction:** The course will be given in English on demand

## Aim

The course aims at providing knowledge in systems biology at different levels of organisation with focus on biological modeling. The course shall give insight and knowledge in biological concepts, and training in modelling of biological systems from genetic to global levels. A further aim of the course is to provide experience of communication with biologists that lack qualifications in engineering and modelling

## Learning outcomes

### *Knowledge and understanding*

For a passing grade the student must

- have a basic knowledge of how biology is studied at different levels of organisation in biology
- have a basic knowledge of fundamental concepts in genetics, cell biology, neurobiology, ecology, global systems, and within biologically inspired mathematical techniques

- have a basic knowledge of modelling traditions in the above disciplines

### *Competences and skills*

For a passing grade the student must

- be able to apply the different modelling techniques on different systems within the course

## Contents

- Levels of biological organization, System perspective, molecular networks
- Neurophysiology: modeling of learning
- behaviour models within dynamic programming
- matrix and game theoretical models on population level
- methods within commercial biological programming, for example neural networks and genetic algorithms

## Examination details

**Grading scale:** TH - (U, 3, 4, 5) - (Fail, Three, Four, Five)

**Assessment:** Project assignments.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

### Modules

**Code:** 0117. **Name:** System Biology.

**Credits:** 7.5. **Grading scale:** TH - (U, 3, 4, 5).

## Admission

**Assumed prior knowledge:** TEK290/EXTG15, FMAF05/FMA450, FRTF05/FRT010 or equivalent. Some skill in Matlab (or programming).

**The number of participants is limited to:** No

**Kursen överlappar följande kurser:** TEK292

## Reading list

- Material distributed by the teachers, articles.

## Contact

**Course coordinator:** Anders Brodin, anders.brodin@biol.lu.se

**Course homepage:** <https://www.biologyeducation.lu.se/biological-systems-extq20>