Evolutionary Perspectives in Biological Sciences, 5.0 credits

Evolutionära perspektiv inom biologiska vetenskaper, 5.0 hp

Third-cycle education course

6FIFMB3

Department of Physics, Chemistry and Biology

Valid from: First half-year 2026

Approved by **Approved**

Registration number

Entry requirements

Entry requirement for studies on third-cycle education courses

- second-cycle degree,
- 240 credits in required courses, including at least 60 second-cycle credits, or acquisition of equivalent knowledge in some other manner

Admission to doctoral studies in Biological Sciences or equivalent discipline. Basic understanding of genetics, physiology, ecology, ethology, microbiology, and biotechnology is recommended. The course is taught in English

Specific information

The course is part of the PhD Program in Biological Sciences at Linköping University. It provides an interdisciplinary overview of evolution as a unifying concept across the life sciences. Each module highlights evolutionary thinking applied to genetics, physiology, ecology, ethology, microbiology, and biotechnology.
The course is open to PhD students within the Faculty of Science and Engineering and other relevant faculties, as well as postdoctoral researchers subject to approval by the course coordinator.

Learning outcomes

The ILOs of the course are focused on three pillars: i) Knowledge and understanding, ii) Competence and Skills and iii) Judgement and approach. After completing the course, the student will be able to:

- Explain fundamental concepts and mechanisms of evolution from the molecular to the ecological level.
- Describe evolutionary models and processes relevant to different fields of biological research.
- Analyze and interpret data from evolutionary research using molecular, ecological, or computational approaches.
- Integrate evolutionary theory into their own research area, linking molecular mechanisms to large-scale biological patterns.
- Communicate evolutionary arguments and findings effectively in written and oral scientific contexts.
- Critically evaluate scientific hypotheses and literature from an evolutionary perspective.
- Reflect on the ethical, biomedical, and societal implications of evolution.
- Demonstrate the ability to apply evolutionary reasoning across interdisciplinary scientific domains.

Contents

The course is structured around **six modules**:

1. **Genetics**: Evolutionary genetics, molecular evolution, and comparative genomics.
2. **Physiology**: Evolution of physiological adaptation to the environment.
3. **Ecology**: Evolutionary ecology, adaptation, and biodiversity.
4. **Ethology**: Evolution of behavior, cognition, and social interactions.
5. **Microbiology**: Evolution of microorganisms, host–pathogen interactions, and antimicrobial resistance.
6. **Biotechnology:** Evolutionary approaches in biotechnology, synthetic biology, or applied biomedical systems.

Each module consists of a lecture introducing the topic, and a **seminar** for discussion of current literature. When relevant, modules may also include an **experimental (wet or dry) laboratory** activity to connect theory with practice.
The final activity of the course is a **seminar presentation day**, where each student presents their evolutionary perspective based on their own research focus or an alternative topic of interest.

Educational methods

Each thematic module includes a lecture introducing the topic followed by a seminar in which students discuss key concepts and recent research articles. Because the course gathers PhD students from diverse research backgrounds, the level of novelty will vary between participants. For example, an ecology-focused student may already be familiar with the ecological evolution module but will gain new insight during the molecular or biomedical evolution sessions. This diversity is an intentional pedagogical element: it encourages interdisciplinary exchange and allows students to teach and learn from each other through discussion and critical reflection.
Active participation in both lectures and seminars is required. The final presentation day synthesizes course outcomes and promotes the integration of evolutionary perspectives across disciplines.

Seminars
Two types of seminars are included in the course and form an essential part of the evaluation process.

1. Standard seminar
Each thematic module includes a standard seminar where a selected topic or scientific paper related to the week's theme is discussed in class. Students are expected to prepare in advance, contribute actively to the discussion, and demonstrate the ability to connect the topic to broader evolutionary principles. Preparation, participation, and analytical engagement will be evaluated.

2. Presentation seminar and peer evaluation
The course concludes with a presentation seminar day. During this session, each student presents their evolutionary perspective, either connected to their own research field or an alternative area of interest. Presentations are followed by peer evaluation and open discussion among participants. Each student acts both as a presenter and as a peer reviewer, providing feedback to another participant. The session is moderated by the course coordinator, who also assesses the quality of the presentation, discussion, and critical reflection.

Examination

Oral presentation and written report (individual assessment)
Active participation in lectures, seminars, and discussions

Compulsory items
Active participation in the compulsory parts is necessary to pass the course, and assessment of them is carried out continuously. Compulsory parts in this course are lectures and seminars.

Scope of re-examination
The extent of a re-examination shall be similar to the regular examination.

Grading

Two-grade scale

Course literature

A list of recommended literature will be provided by the course coordinator before the start of the course.

General information

The course is planned and carried out according to what is stated in this syllabus. Course evaluation, analysis and suggestions for improvement should be fed back to the Research and PhD studies Committee (FUN) by the course coordinator. The course is conducted in English and follows LiU's policy on equal opportunities and diversity. A mandatory course evaluation will be performed and analyzed to ensure alignment with the syllabus and continuous improvement.