Science Education for Postgraduate/Doctoral Students, 3.0 credits

Naturvetenskaplig utbildning för doktorander, 3.0 hp

Third-cycle education course

6FIFM05

Department of Physics, Chemistry and Biology

Valid from: Second half-year 2025

Approved by **Approved**

Registration number

Entry requirements

Entry requirement for studies on third-cycle education courses

- second-cycle degree,
- 240 credits in req acquisition of equivalent knowledge in some other manner

Specific entry requirements for this course

- That the student is actively involved in teaching at the time the course is conducted

Learning outcomes

After the course the students will be able to:

- describe fundamental conditions for learning
- describe content-specific challenges to learning within natural sciences and engineering
- meet, challenge and assist students in a laboratory environment
- describe challenges for teaching and learning at the undergraduate level

Contents

The course consists of three blocks including own reading, seminar discussions, written assignments and a practical teaching exercise. Each block will require preparatory work that each student is responsible for.
Block 1: What promotes learning?

After reading chapter 3 from the book mentioned above and Schneider et al. (2013); Preparing for future learning with a tangible user interface: the case of neuroscience. IEEE Transactions on Learning Technologies, 6(2), 117-129) each student is expected to write a short synopsis addressing the “Questions for reflection” section from the chapter. The synopsis should be sent in via LISAM **before** the seminar takes place. A 2h seminar discussion will follow. Attendance to the seminar is mandatory. Passing this block requires the submission of the synopsis essay (Assignment 1). The essay should not be written as a direct bullet point response to each one of the questions but as a reflection including your own views on teaching and learning in relation to the topics presented in the chapter. Please keep the assignment to a maximum length of a single A4 page.
Block 2: Students prior knowledge and alternative conceptions

After reading chapter 4 from the book mentioned above each student is expected to write a short synopsis addressing the “Questions for reflection” section from the chapter (Assignment 2). The synopsis should be sent in via LISAM before the seminar takes place. A 2h seminar discussion will follow. Attendance to the seminar is mandatory. Your chapter synopsis should be written as a direct bullet point response to each one of the questions but as a reflection including your own views on teaching and learning in relation to the topics presented in the chapter. Please keep the assignment to a maximum length of a single A4 page.

Following the seminar a lecture on acquisition of knowledge and alternative conceptions will be given. Alternative conceptions are a fundamental hinder to learning so fulfilment of learning goals is highly dependent on identifying and understanding how to address alternative conceptions effectively.

Block 2 will be concluded with the main course assignment, a written assignment on alternative conceptions (Assignment 4).

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Assignment 4 consists of two parts, a written and an oral part. The written assignment requires you to identify a misconception in your field of knowledge based on your own experience or with help from the scientific literature (a list of useful references will be provided). After identifying a preconception your role is to design a learning exercise to effectively address and correct it.

Specific instructions for the assignment are given below. The assignment will be also presented orally in the Final Course Seminar.

Passing this block requires the submission of the synopsis essay (assignment 2), the alternative conceptions essay (Assignment 4) as well as the oral presentation.

Block 3: The role of the teacher

After reading chapter 5 from the book mentioned above each student is expected to write a short synopsis addressing the “Questions for reflection” section from the chapter (Assignment 4). The synopsis should be sent in via LISAM before the seminar takes place. A 2h seminar discussion will follow. Attendance to the seminar is mandatory. Your chapter synopsis should be written as a direct bullet point response to each one of the questions but as a reflection including your own views on teaching and learning in relation to the topics presented in the chapter. Please keep the assignment to a maximum length of a single A4 page.
Following on that each student is expected to prepare and conduct a teaching activity that will be attended by the course examiner and fellow course students. In practical terms you can use one of your real teaching assignments and prepare your teaching activity considering what has been discussed in the course. Planning and execution of the assignment could be something along the following lines:
• Planning before the assignment. Consider the learning goals of your teaching moment and your strategy on how to reach those goals. If the teaching moment is longer than 1 h (a lab for example) inform on the most convenient time to be there during the teaching block.

• Execution of the teaching activity.

• Reflection after the assignment. Think about how the teaching went. Reflect on how you think the learning went. Did you achieve your original goals? Could you have done something different?

• Meeting with the course examiner. It could take place immediately after the practical or a few days later.
This block will also require you to attend someone else's teaching (auscultation). Feedback will be provided orally to the student in question in a small meeting where the course responsible will also be present. Passing this block requires the submission of the synopsis essay (assignment 4), conducting your teaching and receiving feedback as well as providing feedback on another student teaching occasion.

Examination

The course will be examined with the four assignments detailed above.

Grading

Two-grade scale

Course literature

The course will use the book "Academic Teaching" by Elmgren and Henriksson as a red thread throughout the course. Complementary research articles for each seminar will be also provided.

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.
If the course is withdrawn or is subject to major changes, examination according to this syllabus is normally offered at three occasions within/in close connection to the two following semesters.