SYLLABUS

Science education for postgraduate/doctoral students, 3 hp

Course category: Single subject Course

This course is given by IFM with the purpose to prepare and assist you in your future teaching duties at your institution and it is equivalent to 3 credits.

Aim of the course
After the course, the students will be able to:
- describe fundamental conditions for learning
- describe challenges for teaching and learning at the undergraduate level
- meet, challenge and assist students in a laboratory environment
- describe content-specific challenges to learning within physics, chemistry and biology

Contents
The course consists of four blocks including lectures, seminars and a practical exercise. Each block may require preparatory work that each student is responsible for.

Block 1: Introduction to Pedagogy, didactics and teaching organization at LiU
An introductory lecture will present and introduce different concepts within science education and will present the organization of the teaching programs at LiU (Lecture 1. Introduction to “Science Education for postgraduate/doctoral students”).

During this block the student is expected to read some of the literature provided in order to complete a written assignment (Assignment 1. Teaching or learning, what is the aim and what is your role in it?). The assignment should be completed before the final activity in block 1, which is a discussion seminar.

As a follow-up from assignment 1, an interactive seminar (Seminar 1) will be staged. Arguments for and against different teaching/learning scenarios will be discussed.

Block 2: Teaching or learning, what is the aim and what is our role in it?
In this block two lectures will be given, usually as consecutive lectures.
Lecture 2. The teaching as a facilitator of learning
Lecture 3. Student-centered education

Block 3: Addressing alternative conceptions in physics, chemistry and biology
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. This will be presented in a lecture (Lecture 4. Addressing alternative conceptions in physics, chemistry and biology) and will be later actively pursued as Assignment 2 of the course.

Assignment 2 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 (see list of references). After identifying it your role is to design a learning exercise to effectively address and correct such misconception.
Specific instructions for the assignment are given below. The assignment will be also presented orally in the Final Course Seminar.

**Block 4: Practical teaching moment and reflections from it**
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. Inform your auscultation committee (PhD students from the course and course responsible) of the time and the location of the teaching. If the teaching moment is longer than 1 h (a lab for example) inform them on the most convenient time to be there during the teaching block.
- **Execution of the teaching activity.** Inform the group of students of the presence of the auscultation committee and carry your teaching duty as planned. The members of the auscultation committee will take notes that will be the base for their subsequent written evaluation.
- **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 auscultation committee.** It could take place immediately after the practical or a few days later. The course examiner HAS TO BE present. The members of the auscultation committee MUST hand in a written assessment with feedback on the teaching. This will be Assignment 3 of the course (Peer feedback).
- **Hand in the written assignment (Assignment 4, read specific instructions below)**

**Course Examination**
The course will be examined with the four assignments detailed above

**Grading**
The course is graded according to hp grading scale G (passed) and U (failed)
Assignment Instructions

The course consists of four blocks including lectures, seminars and a practical exercise. Each block may require preparatory work that each student is responsible for.

Assignments should be submitted via LISAM. Name your assignment as follows:

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abcdeXX-AssignmentY
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where abcde are the letters of your LiU ID
XX are the numbers of your LiU ID
Y is the assignment number (1, 2, 3 or 4)

Assignment 1: Teaching or learning, what is the aim and what is your role in it?

Write an essay describing the advantages and disadvantages of a teacher-centered approach and a student-centered approach. Focus on the specific goal of any teaching activity, which is no other than promote student learning. Make use of the pedagogic and didactic literature available, not only the one referred to in the lecture but any other reference you may find. Write also about the practical implementation of any of the approaches in University higher education based on your own experience. Your reflections will be later used in a seminar discussion.

Length of the essay: 2-4 A4 pages (including references), 1.5 line spacing, 12p Times Roman font

Assignment 2: Alternative conceptions

The assignment requires you to identify an alternative conception in your field of knowledge based on your own experience or with help from the scientific literature (see list of references).

After identifying it, your role is to design a learning exercise to effectively address and correct such alternative conception.

Length of the essay: 4 A4 pages, 1.5 line spacing, 12p Times Roman font

The assignment will be also presented orally in a Final Course Seminar in the form of a 10 min powerpoint presentation.

Assignment 3: Peer feedback

Feedback on the teaching activity given by a peer PhD student. Your comments will be discussed together with the course responsible in a face-to-face meeting. The written assessment should be handed in by that time.

Assignment 4: Teaching didactics

The assignment consists of a written report from your own teaching activity. It should include the following sections:
1. Learning objectives of your teaching activity
2. Preparatory notes. Didactic considerations you made when preparing the teaching activity. Even if the teaching activity was given to you, you are expected to reflect on it and introduce the strategies you deem necessary to favour student learning.
3. Evaluation of the teaching activity. Did it work as expected? What hinders did you encounter? Do you feel that the learning objectives were achieved? Can you prove it?

Length of the essay: 2-4 A4 pages, 1.5 line spacing, 12p Times Roman font
Blocks 1 and 2


Block 3