Department of Physics

Stockholm University

Syllabus

for course at advanced level

Nanoscale Technology
Nanoteknologi

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	FK7054
Valid from:	Autumn 2017
Date of approval:	2017-01-16
Department	Department of Physics
Subject Specialisation:	A1N - Second cycle, has only first-cycle course/s as entry requirements

Decision

This course plan has been established by the Board of Science at Stockholm University on 2017-01-16.

Prerequisites and special admittance requirements

Admission to the course requires knowledge equivalent to passed courses (excluding introductory courses) of 45 credits in mathematics and 60 credits in physics, where the courses Quantum Mechanics, 7.5 credits (FK5020) and Statistical Mechanics and Condensed Matter, 7.5 credits (FK5025) should be included. Additionally, requires knowledge equivalent to upper secondary school English B/English 6.

Course structure

Examination code	Name	Higher Education Credits
HELA	Nanoscale Technology	7.5

Course content

The course describes common processes and materials in microfabrication (photolithography, various types of deposition and etching of thin films), advanced nano-fabrication processes (electron-beam lithography, focused ion-beam etching), as well as different nano-characterization techniques and clean-room equipment. The course has the main focus on the interesting physics behind micro/nano-technology (such as vacuum, plasma, electron-optics, materials science, e.t.c.) and provides an overview over modern research in the nano-science area and the on-going progress in development of processes and materials for micro/nano-technology.

Learning outcomes

After having passed the course the student is expected to be able to:
• describe the chain of process - structure - properties - performance of thin film components
• choose suitable materials and techniques for some thin film applications
• describe how the choice of process parameters will effect the properties of thin films and be able to perform simple calculations of these parameters
• demonstrate both theroretical and practical knowledge regarding methods of nano and micro fabrication used within the field of VLSI (Very Large Scale Integration) technology, microelectronics and micromachining.
• describe the principles of operation of clean room equipment and also be able demonstrate a basic knowledge of current development and research in the field of nano-technology.

Education

The education consists of lectures and laboratory work. Participation in laboratory work and any associated integrated instruction is compulsory. In the event of special circumstances, the examiner may, after consultation with the teacher concerned, grant a student exemption from the obligation to participate in certain compulsory instruction.

The course will be given in English if requested by any student enrolled.

Forms of examination

a. The course is examined as follows: knowledge assessment takes the form of written and oral exams, hands-in and written report of laboratory work. If the instruction is in English, the examination may also be conducted in English.

b. Grades will be set according to a seven-point scale related to the learning objectives of the course:
A = Excellent
B= Very good
C = Good
D = Satisfactory
E = Adequate
Fx = Fail, some additional work required
F = Fail, much additional work required

c. The grading criteria will be distributed at the beginning of the course.

d. In order to pass the course, a minimum grade of E is required.

e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. A student who has received a passing grade on an examination may not retake the examination to attain a higher grade. A student who has failed the same examination twice is entitled to have another examiner appointed, unless there are special reasons to the contrary. Such requests should be made to the department board.

The course includes at least two examination opportunities per year when the course is given. At least one examination opportunity will be offered during a year when the course is not given.

f. Students awarded the grade Fx are given the opportunity to improve their grade to E. The examiner decides the supplementary assignments to be performed and the pass mark criteria. The supplementary assignments will take place before the next examination session.

Interim

Students may request that the examination be conducted in accordance with this course plan even after it has ceased to be valid. However, this may not take place more than three times over a two year period after course instruction has ended. Requests must be made to the departmental board. The provision also applies in the case of revisions to the course plan (and the revisions of the course literature).

Limitations

The course may not be included in examinations in combination with course Nanotechnology, 7.5 credits (FK7018) or equivalent.

Misc

The course can be included as part of the master's programs offered at the Physics department, but is also offered as a separate course.

Required reading

The course literature is decided by the department board and published on the Department of Physics’s website at least two months before the start of the course.