Department of Physics

Stockholm University

Syllabus

for course at advanced level

Simulation Methods in Statistical Physics
Simuleringsmetoder i statistisk fysik

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	FK8028
Valid from:	Spring 2022
Date of approval:	2017-01-16
Changed:	2021-12-15
Department	Department of Physics
Main field:	Physics
Specialisation:	A1F - Second cycle, has second-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 course Quantum Mechanics, 7.5 credits (FK5020) and at least two of the courses Atomic and Molecular Physics, 7.5 credits (FK7023), Nuclear and Particle Physics, Astrophysics and Cosmology, 7.5 credits (FK7024) or Statistical Mechanics and Condensed Matter, 7.5 credits (FK5025) should be included. Additionally, requires knowledge equivalent to upper secondary school English B/English 6.
Finally, knowledge equivalent to Statistical Physics, 7.5 credits (FK7058), Mathematical Methods in Physics, 7.5 credits (FK7048), Programming and Computer Science for Physicists, 7.5 credits (DA7011) as well as Numerical Methods for Physicists II, 7.5 credits (BE7001) is required.

Course structure

Examination code	Name	Higher Education Credits
HELA	Simulation Methods in Statistical Physics	7.5

Course content

In this course simulation methods in statistical physics will be applied on problems involving classical liquids, spin systems and electron structure. Molecular dynamics simulations and (quantum) Monte Carlo simulations will be investigated theoretically and practically.

Learning outcomes

Upon completion of the course, students are expected to be able to:
• use several tools used in simulation methods in statistical physics
• write simple programs for molecular dynamics, Monte Carlo and Monte Carlo simulations
• decide the applicability of different methods for simulating problems within statistical physics

Education

Instruction consists of seminars and supervision of programming project.
The course is given in English.

Forms of examination

a. The course is examined as follows: knowledge assessment takes the form of a written and oral exams and written and oral presentations of the programming project. The examination is 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 the courses Simulation Methods in Statistical Physics, 7.5 credits (FK7029) or Statistical Physics with Applications, 15 credits (FK8009), or equivalent.

Misc

The course Statistical Physics, 7.5 credits (FK7058) is an entry requirement, but cal also be studied in parallel with present course.

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.