



Faculty of Science

FYTM03, Theoretical Physics: Master's Degree Project, 30 credits

Teoretisk fysik: Examensarbete - masterexamen, 30 högskolepoäng
Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2015-06-26 and was last revised on 2020-05-10. The revised syllabus comes into effect 2020-05-10 and is valid from the spring semester 2021.

General information

The course is an elective course (the alternative is FYSM30) for second-cycle studies for a Degree of Master of Science (120 credits) in physics.

Language of instruction: English

Main field of study *Specialisation*

Physics A2E, Second cycle, contains degree project for Master of Arts/Master of Science (120 credits)

Learning outcomes

The aim of the degree project is that the student through an independent project should show knowledge understanding, competence, skills, judgement and approach in accordance with the requirements for obtaining a Degree of Master of Science (120 credits) in physics. The degree project shall be specialised and show that the student can apply scientific methodology.

Knowledge and understanding

On completion of the course, the students shall be able to:

1. describe, use and explain physical theories and their principles including the scientific foundations
2. use and apply the methods of physics in an advanced way
3. describe current research issues in a sub-field of physics
4. in detail describe and explain a specialisation within a sub-field of physics.

Competence and skills

On completion of the course, the students shall be able to:

5. critically and systematically integrate knowledge within physics
6. analyse, assess and deal with complex phenomena, issues and situations within physics even with limited information,
7. critically, independently and creatively identify and formulate issues within physics
8. plan and using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as to evaluate this work
9. orally clearly present and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences both nationally and internationally,
10. in writing clearly present and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences both nationally and internationally,
11. participate in research or development work within the field of physics or work independently in other qualified activities.

Judgement and approach

On completion of the course, the students shall be able to:

12. identify, discuss and make assessments considering relevant scientific, social and ethical aspects of physics and ethical aspects of research and development work
13. identify and discuss the possibilities and limitations of physics, its role in society and the responsibility of the individual for how it is used
14. identify, discuss and plan their own need for further knowledge
15. identify different ways to develop their skills in physics or other fields.

Course content

The student chooses, in consultation with the supervisor and examiner, an independent degree project corresponding to 30 credits. The project can be experimental or theoretical. The project can either be linked to current scientific projects at the department or to problems within the subject area at companies or other departments within or outside the university. If the project is carried out outside the department, there also has to be a supervisor from the department. Proposals on degree projects are, for example, posted on the website of the department.

Course design

The degree project requires a survey of the literature and specialised studies. Furthermore, a number of compulsory course elements in the form of teaching sessions, seminars and other exercises are included that cover, for example, scientific, academic, and popular communication including both written and oral presentation, discussion and feedback.

The project shall correspond to twenty weeks of qualified full-time studies. During the project, guidance is given by a qualified supervisor. If the project is carried out outside the department or the supervisor does not have the competence equal to a docent, then another supervisor that fulfills this requirement will be appointed by the department.

At the beginning of the course, the student and the supervisor has to register the degree project with the course responsible. A plan that contains a definition of the project, an analysis of the problem and a time plan shall be attached to the registration. The plan is written by the student in consultation with the supervisor. The plan has to be approved by the examiner.

During the project, the student should keep a progress diary, where the student analyses and discusses their own learning.

During the implementation of the degree project, at least one progress report is required, for example half way through the planned project time. The progress report consists of a written and an oral report from the student about the progress of the work. The written report is written in consultation with the supervisor and is approved by the examiner. The oral report is made in the form of a shorter seminar.

The degree project is presented in the form of a thesis report in English, with a popular description in Swedish or English. The degree project is also presented orally in English, at a public seminar for discussion, criticism and analysis. Before the presentation, the student, together with the supervisor, shall review the degree project based on the expected learning outcomes in this course syllabus and/or the qualifications for a Master's degree (120 credits) in the Higher Education Act.

Assessment

The examination and the compulsory course elements, which are required to pass course, consists of the following (the learning outcomes that the different parts can examine are given within brackets):

- an approved time plan that is established in the beginning of the project (outcome 1 and 7),
- participation in all compulsory course elements (prepare for outcome 9 and 10),
- written progress report, that is requested and approved by the examiner (outcome 3-4, 7-8, 10-11, 14),
- an oral progress report seminar that is approved by the examiner (outcome 3-4, 7-9, 11, 14),
- a written scientific thesis report about the project (outcome 1-8, 10-15),
- an oral presentation of the project, before an examination committee consisting of the examiner and at least one assessor who is an expert in the field. Supervisors have the right to attend and voice their opinion when the examination committee meets to decide the grade (outcome 1-9, 11-15),
- a popular science description of the project (outcome 10, 12-13),
- a brief description of the implementation of the project and reflection over the student's learning that is approved by the examiner (outcome 10 and 14).

The written report has to be submitted to the examiner, in a version that admits examination, at least two weeks before the seminar. Before that, the report has to be checked by the supervisor. The department is responsible for making copies of the report according to the requirements of the university and the faculty. After final approval, the student is responsible for archiving the report in the system supplied by the university.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction

The final grade is determined by combining the results in the different parts of the examination. The examiner decides the grade in consultation with the examination committee. The supervisor has the right to attend and voice their opinion at the meetings of the examination committee. If the examiner assesses that the degree project can not be approved, the student shall be given possibility to supplement the project for renewed assessment within approximately half a semester. However, it is important that this extended time for completion does not contradict learning outcome 8. If the degree project does not satisfy the learning outcomes for the course after this renewed assessment, the examiner can decide to fail it. This can imply that a new project is required, so that all learning outcomes can be fulfilled.

Grading criteria shall be available at the department at the beginning of the course.

Entry requirements

For admission to the course, a Bachelor's degree in physics or the equivalent is required. Furthermore, it is required to have knowledge equivalent to: FYSM01 Physics 4: Introduction to advanced studies in physics 30 credits, including FYSN21 Quantum physics in research and society 7.5 credits and FYTN18 Theoretical particle physics 7.5 credits or FYTN05 Theoretical biophysics 7.5 credits depending on specialisation of the degree project, English B and 45 credits in mathematics.

Further information

See also the rules and recommendations for degree projects at the faculty of Science (Dnr N 2011/130)