Programme syllabus

Master's Programme, Photonics, 120 credits
Masterprogram, fotonik
120.0 credits

Valid for students admitted to the education from autumn 11 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

Knowledge and understanding
For a master’s degree in Photonics the student shall:

- show knowledge and understanding in the area of Photonics, comprising a wide knowledge of the area as well as more profound knowledge of some parts of the area, and insight into current research and development work, and
- show visa fördjupad metodkunskap inom Fotonik

Skills and abilities
For a master’s degree in Photonics the student shall:

- show ability to critically and systematically integrate knowledge and to analyze, evaluate and handle complex occurrences, issues and situations even with limited information
- show ability to critically, independently and creatively identify and formulate issues, to plan and with adequate methods perform qualified tasks within given time limits and thereby contribute to the evolution of knowledge as well as assess the work
- show ability, in domestic and international venues, to orally and in writing present and discuss conclusions and the knowledge and the arguments on which these are based, in dialogue with different groups, and
- show such skills which are required for participation in research and development work or in other independent work of a qualified nature.

Ability to make judgements and adopt a standpoint
For a master’s degree in Photonics the student shall:

- show ability to make assessments taking into account relevant scientific, societal and ethic aspects as well as show awareness of ethical aspects of research and development work
- show insight into the possibilities and limitations of science, its role in society and the responsibility of humans for its use,
- show ability to identify her/his need for additional knowledge and take responsibility for the development of his/her own knowledge.
Local regulation for qualifications at first- and second cycle: KTH Regulations

**Extent and content of the programme**

The educational program comprises two years, and a master’s degree is awarded after completion of the course requirements of 120hp.

The level of the education is “advanced” (second cycle).

All students follow the same line of study.

The language of education is English except in courses in the Swedish language.

**Eligibility and selection**

The basic requirement for admission to a master’s program at advanced level is a national university degree at basic level (undergraduate, first cycle) of at least 180hp or an equivalent international degree.

The specific prerequisites for admission to the master’s program in Photonics are previous courses in wave theory and theoretical electromagnetism at a level corresponding to a “kandidatexamen” in electrical engineering or an equivalent international degree (bachelor of science in electrical engineering).

A good knowledge of English, equivalent to Eng B or TOEFL paper based test, total of 575, 4.5 writing section TOEFL internet based test, total of 90, 20 writing section IELTS score of at least 6.5, no band lower than 5.5 (only academic training accepted)

The admission of students in the master’s program in Photonics follows an evaluation of merits based mainly on the applicant’s knowledge, previous education, the university where the studies have been performed, especially meriting previous subjects, study motivation, and references. The knowledge of the applicant is given preference in this evaluation. Eligible applicants are ranked according to the evaluation and admission is granted according to the number available positions determined for the program.

Admission to Master of Science programmes (60/120 credits) with teaching in English: KTH Regulations

**Implementation of the education**

**Structure of the education**

The program consists of two academic years, each comprising about 9 months and divided into two terms with two study periods per term. Each study period ends in an examination period.

The first year consists mainly of compulsory courses in optics, principles of communications, quantum electronics, methodology of science, fiber-optical communications, and photonics. Courses in laser engineering and optical measurement techniques are conditionally elective.

**Courses**

The programme is course-based. Lists of courses are included in appendix 1.

The courses are either compulsory or conditionally elective. After application, students may be allowed to take extra courses which can be included in the degree but which can not take the place of compulsory or conditionally elective courses to fulfill the requirements for a degree.

**Grading system**

Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.
At KTH a grading scale with seven levels A-F is used for final grades in advanced level courses and for the thesis. A-E are passing grades where A is the highest grade.

The grades pass (P) and fail (F) are for partial grades in some courses, for example for laboratories, and as final grades in small conditionally elective courses.

**Conditions for participation in the programme**

Students make a study enrolment before each term. Courses are chosen by the student prior to the second term of the first year and prior to each of the two terms of the second year. The choice is limited to the courses in the course list.

Students who are term registered are considered as expected students in all chosen courses. Students announce their participation in an individual course to the teacher responsible for the course in the beginning of the course. Students announce possible interruptions in their studies to the teacher responsible for the course.

A student is allowed to start the second year of studies after promotion to the second year. The condition for promotion to the second year is completion of 45 hp in the first year.

**Recognition of previous academic studies**

Policy on credit transfer for higher education courses including prior learning: KTH Regulations

**Studies abroad**

The courses of the first year of the program should be followed at KTH, and the master’s thesis project in the second year may be performed at universities or companies abroad.

**Degree project**

To be awarded a master’s degree in Photonics the student must, within the course requirements, have fulfilled an independent work (the degree project) of at least 30hp in Photonics.

The subject for the degree project may be chosen by the student to be performed at KTH, at other universities, or in industry. A student who has been promoted to the second year may apply to start a thesis project. The thesis is graded on the scale A-F according to the guidelines determined by KTH and by the School of ICT.

Conditions for starting the degree project is promotion to the second year.

Comprehensive rules and guidelines for degree project work 30 credits, regarding Master (120 credits) : KTH Regulations

**Degree**

The Master’s degree is obtained after completion of the courses and the thesis with a total of at least 120hp. The degree is “Teknologimasterexamen”, translated into English as "Degree of Master of Science (two years)". The degree is awarded after application from the student.

Local regulation for qualifications at first- and second cycle : KTH Regulations

Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions
Appendix 1: Course list

Master's Programme, Photonics, 120 credits (TPHSM), Programme syllabus for studies starting in autumn 2011

**General courses**

**Year 1**

**Mandatory courses (51.0 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and Technological Science)</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IF2651</td>
<td>Quantum Electronics</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IK2651</td>
<td>Principles of Communications</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2651</td>
<td>Optics</td>
<td>9.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2653</td>
<td>Fiber-optical Communication</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2655</td>
<td>Photonics</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2663</td>
<td>Semiconductor- and Nano-Optics</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

**Conditionally elective courses**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM2653</td>
<td>Molecular Electronics</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2659</td>
<td>Laser Engineering</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>LI106N</td>
<td>Information Searching</td>
<td>1.5</td>
<td>First cycle</td>
</tr>
<tr>
<td>SK2350</td>
<td>Optical Measurement Techniques</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

**Supplementary information**

Optional courses for both first and second year:
- SK2350 Optical Measurement Techniques
- IM2653 Molecular Electronics
- IO2659 Laser Engineering
### Year 2

#### Mandatory courses (22.5 credits)

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IH2656</td>
<td>Advanced Semiconductor Materials</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2654</td>
<td>Optical Networking</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IT2651</td>
<td>Microwave Engineering</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

#### Conditionally elective courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI2410</td>
<td>Field Theory for Guided Waves</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IH2653</td>
<td>Simulation of Semiconductor Devices</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IM2653</td>
<td>Molecular Electronics</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IO2659</td>
<td>Laser Engineering</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>SK2350</td>
<td>Optical Measurement Techniques</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>

#### Supplementary information

Optional courses for both first and second year:
- SK2350 Optical Measurement Techniques
- IM2653 Molecular Electronics
- IO2659 Laser Engineering
Appendix 2: Specialisations

Master's Programme, Photonics, 120 credits (TPHSM), Programme syllabus for studies starting in autumn 2011

This programme has no specialisations.