



Programme syllabus

[An accessible version of the syllabus can be found in the Course and programme directory.](#)

Master's Programme, Photonics 120 credits

Masterprogram, fotonik

Valid for students admitted to the education from autumn 10 (HT - Autumn term; VT - Spring term).

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

Programme objectives

The program is organized by a consortium of 5 European universities in 3 countries where KTH is one partner in the consortium. The students spend the first year in one country and the second year in any of the other two countries. All combinations of countries and universities are possible. After completing the two years, the students are awarded double degrees from the two universities they attended. The name of the program used by the consortium is Erasmus Mundus MSc in Photonics, EMMP. The conditions for the education and the requirements for a double degree are determined in a consortium agreement between the rectors of the universities in the consortium. The KTH part of this program is closely related to the Masterprogram in Photonics at KTH and most of the courses are common.

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 advanced knowledge in Photonics methods

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 ethical 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.

Extent and content of the programme

The educational program comprises two years, and double master's degrees are 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 at KTH, during either the first or the second year of the program. The language of education at KTH 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 at KTH for admission to the master's program Erasmus Mundus 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. 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. The evaluation of applications is performed by the Program Advisory Group consisting of one member from each of the universities in the consortium.

Implementation of the education

Structure of the education

The program at KTH 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 at KTH 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 education is organised in courses. Lists of courses are found 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 fulfil 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. The other universities in the consortium use different national grading scales. The consortium has agreed to use the relevant grading scheme of the European Credit Transfer System (ECTS) as a means of comparing student performance in the different universities.

Conditions for participation in the programme

Each student who has been admitted to the master's program in Photonics is admitted to the compulsory courses belonging to a program term after program term registration. Conditionally elective 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 stated as conditionally elective in the course list. Students who are term registered are considered as expected students in all compulsory courses and in chosen elective 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, including the master's thesis project, after promotion to the second year. The condition for promotion to the second year is that the university where the first year is spent notifies the consortium of completion of the first year for each student.

Recognition of previous academic studies

KTHs policy för tillgodoräkande: KTH-handboken II 13.3.

Studies abroad

All students study in two different countries during the program, following the directions for mobility in Erasmus Mundus from the European commission.

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 from offered subjects at the university where the second year will be spent. A thesis at KTH is graded on the scale A-F according to the guidelines determined by KTH and by the School of ICT. A-E are passing grades.

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 "Teknologie masterexamen", translated into English as "Degree of Master of Science (two years)". The degree is awarded after application from the student.

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Master's Programme, Photonics (TPHOM)

General courses

Year 1

Mandatory courses (48.0 Credits)

Code	Name	Credits	Edu. level
IF2651	Quantum Electronics	7.5 hp	Second cycle
IK2651	Principles of Communications	6.0 hp	Second cycle
IO2651	Optics	9.0 hp	Second cycle
IO2653	Fiber-optical Communication	7.5 hp	Second cycle
IO2655	Photonics	7.5 hp	Second cycle
IO2656	Photonics Applications, Photonics, Extended Course, EMMP Summer School	3.0 hp	Second cycle
IO2659	Laser Engineering	7.5 hp	Second cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AK1213	Swedish Society, Culture and Industry in Historical Perspective	7.5 hp	First cycle
DS1502	Swedish 1, Elementary Level	7.5 hp	First cycle
IM2653	Molecular Electronics	7.5 hp	Second cycle
IO2652	Optics, Continuation Course	6.0 hp	Second cycle
LI106N	Information Searching	1.5 hp	First cycle
SK2350	Optical Measurement Techniques	6.0 hp	Second cycle

Year 2

Mandatory courses (7.5 Credits)

Code	Name	Credits	Edu. level
AK2036	Theory and Methodology of Science with Applications (Natural and Technological Science)	7.5 hp	Second cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AK1213	Swedish Society, Culture and Industry in Historical Perspective	7.5 hp	First cycle
DS1502	Swedish 1, Elementary Level	7.5 hp	First cycle
IH2653	Simulation of Semiconductor Devices	7.5 hp	Second cycle
IH2656	Advanced Semiconductor Materials	7.5 hp	Second cycle
IM2653	Molecular Electronics	7.5 hp	Second cycle
IO2654	Optical Networking	7.5 hp	Second cycle
IO2657	Photonics Laboratory, Photonics Extended Course	4.5 hp	Second cycle
IO2659	Laser Engineering	7.5 hp	Second cycle
IT2651	Microwave Engineering	7.5 hp	Second cycle
SK2350	Optical Measurement Techniques	6.0 hp	Second cycle



Appendix 2: Specialisations

Master's Programme, Photonics (TPHOM)

This programme has no specialisations.