photonics

certificate

bachelors

doctoral

masters

Directory

Photonics training courses

2015 / 2016

Photonics4All

introduction

Where to study Photonics? If you are interested in training to work in this innovative and challenging sector, you will find in this new directory all the optics training courses offered by universities and schools in Sweden.

This directory is your tool. Whether you are a young or advanced student and interested in developing or improving your skills in optics, you will find the answers to help guide you through the options and direct your career path.

table of content

BACHELORS

Optics - Theory and Application
Linköping University

Linköping
The aim of the course is to give basic knowledge elektromagnetic waves with a focus on optics. After successful examination the student should;
- be able to solve problems related to geometrical optics
- be able to solve problems related to wave optics
- be able to solve problems related to photon optics

Contact : *Kenneth Järrendahl − kenneth.jarrendahl@liu.se*
http://kdb-5.liu.se/liu/lith/studiehandboken/svkursplan.lasso?&k_kurskod=TFYA84&k_budget_year=2015

Electromagnetism and Waves (SK1110)
Royal Institute of Technology

Stockholm
- Electrostatics : Field and potential, Gauss's theorem, metals and dielectrics, the capacitor, electrostatic energy.
- Magnetism : Sources of the field, force and torque, magnetic materials and magnetic energy, technical applications, induction and inductance, mechanical waves.
- Electromagnetic waves : Geometrical optics, polarization, interference and diffraction, coherence.

Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1110?l=en

Electromagnetism and Waves (SK1111)
Royal Institute of Technology

Stockholm
- Electrostatics: Electric force, field and potential, Gauss's theorem, electric field and potential in metals and dielectrics, principles of the capacitor, electrostatic energy.
- Magnetism: Sources of the field, force and torque, magnetic materials and magnetic energy, technical applications, induction and inductance.
- Waves: Mechanical waves and acoustics. Generation of electromagnetic waves, polarisation, interference and diffraction, coherence. Lasers. Basic geometrical optics. Technical applications.

Contact : *Lars-Gunnar Andersson − 5537 8107 − lga@physics.kth.se*
https://www.kth.se/student/kurser/kurs/SK1111?l=en

Electromagnetism and Waves (SK1114)
Royal Institute of Technology

Stockholm
- Electrostatics : Electric force, electric field and potential, Gauss's theorem,electric fields inmetals and dielectrics, the capacitor, electrostatic energy.
- Magnetic fields : Sources of the field, force and torque, magnetic materials and magnetic energy. Electromagnetic induction.Introduction to the relationship between electric and magnetic fields, Maxwells equations.
- Mechanical waves : Fundamental wave concepts. Acoustics and ultrasound. Technical applications.
- Electromagnetic waves : Generation, polarisation, interference, diffraction and applications. Basic geometrical optics. The laser, camera, telescope, microscope and the human eye.

Contact : *Martin Viklund − +46 8 553 781 34 − bmw@kth.se*
https://www.kth.se/student/kurser/kurs/SK1114?l=en

Photography for Media (SK1140)
Royal Institute of Technology

Stockholm
Optical imaging, Photographic Lens, Perspective, photometry camera's components and their function, Electronic image sensors, sampling criteria applied to digital images, Color Photography, Quality Dimensions of images (resolution, MTF, noise, dynamics).
Contact : *Kjell S Carlsson − +46 8 553 781 32 − kjellc@kth.se*
https://www.kth.se/student/kurser/kurs/SK1140?l=en

Physics (SK1113)
Royal Institute of Technology

Stockholm
Electrostatics: Field and potential, Gauss's theorem, metals and dielectrics, the capacitor, electrostatic energy.
Magnetism: Sources of the field, force and torque, magnetic materials and magnetic energy, technical applications, induction and inductance, mechanical waves.
Electromagnetic waves: Geometrical optics, polarization, interference and diffraction, coherence.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1113?l=en

Physics I (SK1112)
Royal Institute of Technology

Stockholm
- Electrostatics: Field and potential, Gauss's theorem, metals and dielectrics, the capacitor, electrostatic energy.
- Magnetism: Sources of the field, force and torque, magnetic materials and magnetic energy, technical applications, induction and inductance, mechanical waves.
- Electromagnetic waves: Geometrical optics, polarization, interference and diffraction, coherence.

Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1112?l=en

Physics: Waves and Particles (SK1131)
Royal Institute of Technology

Stockholm
The course gives an introduction to university physics with electromagnetism, quantum-, atomic-, nuclear- and material physics alignment.
Contact : *Fredrik Laurell − +46 8 553 781 53 − flaurell@kth.se*
https://www.kth.se/student/kurser/kurs/SK1131?l=en

Classical Physics (SK1101)
Royal Institute of Technology

Stockholm
Basic concepts of classical physics accompanied by laboratory sessions.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1101?l=en

Classical Physics (SK1102)
Royal Institute of Technology

Stockholm
Basic concepts of classical physics accompanied by laboratory sessions.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1102?l=en

Classical Physics for CL (SK1103)
Royal Institute of Technology

Stockholm
Basic concepts of classical physics accompanied by laboratory sessions.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1103?l=en

Lasers and Applications (SK181N)
Royal Institute of Technology

Stockholm
The course aims to give basic knowledge about the construction and functioning of the laser. The course will also show how the laser can be used within application as information technology, environmental science and medicine.
Contact : *Martin Viklund & Olli Launila − +46 8 553 781 34 − bmw@kth.se*
https://www.kth.se/student/kurser/kurs/SK181N?l=en

Waves (SK1120)
Royal Institute of Technology

Stockholm
Fundamental wave entities.
- Mechanical waves: Intensity, reflection, standing waves, acoustical phenomena and metrology, ultrasonic waves.
- Electromagnetic waves: Geometrical optics, polarization, interference and diffraction, coherence. The laser and the laser beam. Optical fibers.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK1120?l=en

Fundamental Physics I (SK1150)
Royal Institute of Technology

Stockholm
Mechanics, Electromagnetism and Atomic Physics
Contact : *Lars-Gunnar Andersson − 5537 8107 − lga@physics.kth.se*
https://www.kth.se/student/kurser/kurs/SK1150?l=en

Project Work in Applied Physics (SK2001)
Royal Institute of Technology

Stockholm
The project consists of an independent work within a problem area as determined by the examiner. It will normally be part of an advanced course in technical area and be on an advanced level. The project work shall correspond to 20 weeks full-time studies. The work will be presented in a written report and presented orally at an open seminar.
Contact : *https://www.kth.se/student/kurser/kurs/SK2001?l=en*

Optics
Chalmers University of Technology

Gothenburg
Aims to introduce optics, as an important part of physics, in the Engineering physics programme.
Contact : *Jörgen Bengtsson − 031 772 15 91 − jorgen.bengtsson@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23199

High Frequency Electromagnetic Waves
Chalmers University of Technology

Gothenburg
The aim of this course is to give a basic description and understanding of high frequency electromagnetic wave phenomena as they occur in modern applications as e g fibre optics, laser and microwave techniques and microelectronics. The students will learn to apply Maxwell's electromagnetic theory.
Contact : *Magnus Karlsson, Vincent Desmaris − 031 772 15 90 − magnus.karlsson@chalmers.se − https://www.student.chalmers.se/sp/course?course_id=23128*

Optics and Photonics
Luleå University of Technology

Gothenburg
For 3'rd year students on Y (Engineering physics and Elec.)
Contact : *Mikael Sjödahl, Vincent Desmaris − 0920-491220 − mikael.sjodahl@ltu.se*

MASTERS

Materials optics
Linköping University

Linköping
The course objective is to give a physical background to linear optical properties of materials, to describe how they can be measured and analyzed with modern techniques and to give examples of how they can be utilized in devices and for understanding of advanced optical structures.
Contact : *Hans Arwin − hans.arwin@liu.se*
http://kdb-5.liu.se/liu/lith/studiehandboken/svkursplan.lasso?&k_kurskod=TFYA04&k_budget_year=2015

Biomedical Optics
Linköping University

Linköping
The course should provide a possibility for the student to acquire knowledge about the physical properties of light and its impact and interaction with biological tissue.
Contact : *Göran Salerud − goran.salerud@liu.se*
http://kdb-5.liu.se/liu/lith/studiehandboken/svkursplan.lasso?&k_kurskod=TBMT36&k_budget_year=2015

Optoelectronics
Linköping University

Linköping
The overall aim of this course is to give fundamental knowledge of optoelectronic devices and fiber optics in order to be able to understand present and future technologies for applications in optical communications, sensor/imaging techniques, as well as energy conversion that has found renewed interest recently due to world-wide demands of energy saving and new energy production.
Contact : *Wei-Xin Ni − wei-xin.ni@liu.se*
http://kdb-5.liu.se/liu/lith/studiehandboken/svkursplan.lasso?&k_kurskod=TFYA38&k_budget_year=2015

Optoelectronics
Linköping University

Linköping
The overall aim of this course is to give fundamental knowledge of optoelectronic devices and fiber optics in order to be able to understand present and future technologies for applications in optical communications, sensor/imaging techniques, as well as energy conversion that has found renewed interest recently due to world-wide demands of energy saving and new energy production.
Contact : *Wei-Xin Ni − wei-xin.ni@liu.se*
http://kdb-5.liu.se/liu/lith/studiehandboken/svkursplan.lasso?&k_kurskod=TFYA38&k_budget_year=2015

Optical Physics (SK2300)
Royal Institute of Technology

Stockholm
- The course hast wo main aims : To give deepened and widened insight into optical physics seen both as science and as technology.To create a fundament for the more specialized courses in optics.
- Course main content : Electromagnetic fields, propagation in vacuum and matter. Polarization, interference, thin film optics, optical metrology. Diffraction, fourier optics, coherence.

Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
http://www.kth.se/student/kurser/kurs/SK2300?l=en

Laser Physics (SK2411)
Royal Institute of Technology

Stockholm
Essentials of quantum-mechanical description of the of the interaction between photons and electrons in optical gain media.
Basic properties of lasers and photon amplifiers.
Physical principles of laser action.
Essential knowledge of laser building blocks.
Overview of the most important laser types.

Contact : *Valdas Pasiskevicius − +46 8 553 781 55 − vp@kth.se*
http://www.kth.se/student/kurser/kurs/SK2411?l=en

Solid State Physics (IM2660)
Royal Institute of Technology

Stockholm
This course gives an introduction to solid state physics with emphasis on properties of electro-technically important crystalline materials. The primary theme is to study the basic theory of structure, composition and physical properties of crystalline materials.

Contact : *Anand Srinivasan − +46 8 790 43 82 − anand@kth.se*
https://www.kth.se/student/kurser/kurs/IM2660?l=en

Optical Physics (SK2301)
Royal Institute of Technology

Stockholm
Course main content:Chromatic and monochromatic aberrations and their implications Methods to minimize aberration effects. Managing an optical design program.

Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2301?l=en

Problem Solving in Optics (SK2320)
Royal Institute of Technology

Stockholm
The student will, after the course, be able to solve the type of optics related problems that can occur in a professional work situation.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2320?l=en

Optical Systems Design (SK2330)
Royal Institute of Technology

Stockholm
Geometrical optics, aberration theory, evaluation of optical systems, ray-tracing using commercial software, methods of optical design.
Contact : *Anna Burvall − +46 8 553 788 51 − anna.burvall@biox.kth.se*
https://www.kth.se/student/kurser/kurs/SK2330?l=en

Fourier optics (SK2340)
Royal Institute of Technology

Stockholm
The overall aim of the course is that you should be able to analyze optical problems with the help of the approximations made in Fourier optics.
Contact : *Ulrich Vogt − +46 8 553 788 89 − uvogt@kth.se*
https://www.kth.se/student/kurser/kurs/SK2340?l=en

Optical Measurement Techniques(SK2350)
Royal Institute of Technology

Stockholm
With the previous courses in optics and waves as a background, the goal in this course is to specialize within chosen parts in modern optical physics, with consideration of the special aspects in metrological applications within industry and research.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2350?l=en

Quantum Electronics with Electro Optics (SK2400)
Royal Institute of Technology

Stockholm
Course main content: Quantum mechanics directed towards quantization of the electromagnetic field, coherent states. Gaussian beams, optical resonators and rate equations. Types of lasers. Electro-optic and acousto-optic modulation. Non-linear optical formalism and parametric processes. Higher order nonlinearities and phase conjugation. Q-switching and mode-locking. Waveguiding.
Contact : *Katia Gallo − 08 553 786 95 − gallo@kth.se*
https://www.kth.se/student/kurser/kurs/SK2400?l=en

Physics of Biomedical Microscopy (SK2500)
Royal Institute of Technology

Stockholm
Course main content: Basic optical layout of the light microscope. Aberrations. Microscope objectives. Magnification. Numerical aperture. Microscope photometry. Detectors. Noise. Contrast methods (fluorescence, phase contrast, DIC). Resolution. Fourier methods. Optical transfer functions. Three-dimensional imaging in microscopy. Sampling and reconstruction of image data. Confocal microscopy. A brief introduction to tunnel and atomic force microscopy, electron microscopy, scanning near-field optical microscopy and X-ray microscopy.
Contact : *Kjell S Carlsson − +46 8 553 781 32 − kjellc@kth.se*
https://www.kth.se/student/kurser/kurs/SK2500?l=en

X-ray Physics and Applications (SK2550)
Royal Institute of Technology

Stockholm
Part 1: X-ray basics
X-ray interaction with matter, X-ray sources, X-ray optics, X-ray detectors
Part 2: Application examples and special topics
Contact : *Ulrich Vogt − +46 8 553 788 89 − uvogt@kth.se*
https://www.kth.se/student/kurser/kurs/SK2550?l=en

Nanophotonics and Bionanophotonics (SK2560)
Royal Institute of Technology

Stockholm
This course has been developed in parallel with the fast-advancing multidisciplinary research and technological developments in the field of nanophotonics and bionanophotonics, and addresses three main areas:
1. Quantum mechanical description of light-matter interaction in nanostructure
2. Nanophotonics
3. Nanobiophotonics: Nanotechnology for Biophotonics
Contact : *Ying Fu − +46 8 524 848 89 − fu@kth.se*
https://www.kth.se/student/kurser/kurs/SK2560?l=en

Laser Spectroscopy (SK2800)
Royal Institute of Technology

Stockholm
The course aims to give basic knowledge about the construction and function of the laser, and about its use in optics, molecular physics, biophysics, physical chemistry, and chemical physics. The students will gain skills in handling modern lasers, spectrometers and detectors.
Contact : *Fredrik Laurell − +46 8 553 781 53 − flaurell@kth.se*
https://www.kth.se/student/kurser/kurs/SK2800?l=en

Research Methodology in Physics (SH2007)
Royal Institute of Technology

Stockholm
After having completed the course, you should be able to:
- Summarize, assess and present a scientific paper in front of an audience of peers
- Describe the peer review system in the academic world, specifically within physics
- Evaluate the validity and possible errors in conclusions based on complex data.

Contact : *Torbjörn Bäck − +46 8 553 780 41 − back@kth.se*
http://www.kth.se/student/kurser/kurs/SH2007?l=en

Electro Optics (SK2401)
Royal Institute of Technology

Stockholm
Gaussian beams, optical resonators and rate equations. Types of lasers. Electro-optic and acousto-optic modulation. Non linear optical formalism and parametric processes. Higher order nonlinearities and phase conjugation. Q-switching and mode-locking. Waveguiding.
Contact : *Katia Gallo − +46 8 553 786 95 − gallo@kth.se*
https://www.kth.se/student/kurser/kurs/SK2401?l=en

Experimental Methods in Molecular Biophysics (SK2520)
Royal Institute of Technology

Stockholm
Fundamental properties of biomolecules. Basic thermodynamics of biomolecules, biomolecular dynamics and interactions. The principles of the following methods: Infrared-, Fluorescence-, Nuclear Magnetic Resonance-, Electron Spin Resonance-, Circular Dichroism- and Raman-spectroscopy, Mass spectrometry, X-ray crystallography, Electron Microscopy, Surface Plasmon Resonance, Atomic Force Microscopy. An overview of applications of these techniques in fundamental academic research, in pharmaceutical and biotech industry, and for clinical diagnostics.
Contact : *Jerker Widengren − +46 8 553 780 30 − wideng@kth.se*
https://www.kth.se/student/kurser/kurs/SK2520?l=en

Fluorescence Spectroscopy for Biomolecular Studies (SK2521)
Royal Institute of Technology

Stockholm
Introduction to fluorescence, Physical description of absorption and emission processes, fluorescence markers and their characteristics, environmental effects / fluorescence molecular sensors, other photo-induced non-fluorescent states of fluorophores, polarization and rotational measurements of molecules, resonance energy transfer (FRET) and molecular distance measurements with fluorescence, ultra-sensitive fluorescence spectroscopic and microscopic techniques, including single molecule spectroscopy and methods based on fluctuation analysis, applications of fluorescence spectroscopy in biology, medicine and drug development.
Contact : *Jerker Widengren − +46 8 553 780 30 − wideng@kth.se*
https://www.kth.se/student/kurser/kurs/SK2521?l=en

Fourier optics (SK2340)
Royal Institute of Technology

Stockholm
The overall aim of the course is that you should be able to analyze optical problems with the help of the approximations made in Fourier optics. Course main content:
- 2-dimensional Fourier transform, discrete Fourier transform
- Foundations of scalar diffraction theory
- Kirchhoff and Rayleigh-Sommerfeld diffraction theories
- Fresnel and Fraunhofer diffraction
- Wave-optics analysis of coherent systems
- Frequency analysis of optical imaging systems
- Image processing

Contact : *Ulrich Vogt − +46 8 553 788 89 − uvogt@kth.se*
https://www.kth.se/student/kurser/kurs/SK2340?l=en

Introduction to Scanning Probe Microscopy (SK2740)
Royal Institute of Technology

Stockholm
The objective is to offer students an opportunity to learn the theory of operation of scanning probe microscopes, and to gain hands-on understanding of scanning probe microscope operation, with particular emphasis on the Atomic Force Microscope (AFM).
Contact : *David B Haviland − +46 8 553 781 37 − haviland@kth.se*
https://www.kth.se/student/kurser/kurs/SK2740?l=en

Laser Metrology and Optical Metrology (SK2360)
Royal Institute of Technology

Stockholm
Optics repetition. Laser and laser radiation, optical fibers. Distance and velocity measurements. Measurement illustrations. Holographic methods.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2360?l=en

Optics, Supplementary Course for the Media Programme (SK2375)
Royal Institute of Technology

Stockholm
Refresh of basic optics, camera optics, zoom, aberrations, depth of field and depth of focus, photmetry, light transport in camera optics, projector optics and ligth transport in projectors, alternative projector and display types, optics of the human eye, 3D vision, color vision.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2375?l=en

Problem Solving in Optics, Continuation Course 1 (SK2321)
Royal Institute of Technology

Stockholm
The student will, after the course, be able to solve the type of optics related problems that can occur in a professional work situation. The course is a “problem solving course”, without ordinary lectures. The main content is therefore depending on the choice of problems.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2321?l=en

Problem Solving in Optics, Continuation Course 2 (SK2322)
Royal Institute of Technology

Stockholm
The student will, after the course, be able to solve the type of optics related problems that can occur in a professional work situation. The course is a “problem solving course”, without ordinary lectures. The main content is therefore depending on the choice of problems.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2321?l=en

Physics of Biomedical Microscopy, Extended Course (SK2501)
Royal Institute of Technology

Stockholm
Basic optical layout of the light microscope. Aberrations. Microscope objectives. Magnification. Numerical aperture. Microscope photometry. Detectors. Noise. Contrast methods (fluorescence, phase contrast, DIC). Resolution. Fourier methods. Optical transfer functions. Three-dimensional imaging in microscopy. Sampling and reconstruction of image data. Confocal microscopy. A brief introduction to tunnel and atomic force microscopy, electron microscopy, scanning near-field optical microscopy and X-ray microscopy.
Contact : *Kjell S Carlsson − +46 8 553 781 32 − kjellc@kth.se*
https://www.kth.se/student/kurser/kurs/SK2501?l=en

Physics of Visual Impressions (SK2370)
Royal Institute of Technology

Stockholm
The main goal with the course is to extend the basic course in physics to develop an understanding of vision related physics.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2370?l=en

Physics of Visual Impressions, Larger Course (SK2371)
Royal Institute of Technology

Stockholm
The main goal with the course is to develop an understanding of vision related physics.Basic geometrical and physical optics.Optics of the human eye, accommodation, adaptation and convergence. Different methods for 3D-illusion. Wavelength and colour, colour spaces and colorimetry. Colour in dyes and pigments. Additive and subtractive colour mixing. Photometry and illumination. Cameras and imaging. Quality in camera imaging. Aliasing.
Contact : *U Göran Manneberg − +46 8 553 781 27 − mabego@kth.se*
https://www.kth.se/student/kurser/kurs/SK2371?l=en

Technical Photography (SK2380)
Royal Institute of Technology

Stockholm
Optical imaging. Photographic lenses. Photometry. The camera. Photographic film. Digital cameras. Electronic imaging sensors. Tone reproduction. Color photography. Photographic prints. X-ray, ultraviolet and infrared photography. High speed photography. Imaging quality.
Contact : *Kjell S Carlsson − +46 8 553 781 32 − kjellc@kth.se*
https://www.kth.se/student/kurser/kurs/SK2380?l=en

Photovoltaics (5cr)
Dalarna University

Borlänge
The course deals with principles of solar cells and their physics including various semiconductor materials and their suitability for solar cell manufacturing and absorption of solar radiation. The second part of the courses deals with PV system components, system principle and basic sizing.
Contact : *Frank Fiedler − 46778711 − ffi@du.se*
http://www.du.se/en/solar

Design of PV and PV hybrid systems (5cr)
Dalarna University

Borlänge
The course deals with detailed sizing and designing of components and complete PV and PV hybrid systems. The course includes computer simulation with PVsyst and Homer, system analysis as well as performance and economical evaluations.
Contact : *Frank Fiedler − 46778711 − ffi@du.se*
http://www.du.se/en/solar

Wireless, Photonics and Space Engineering (MPWPS)
Chalmers University of Technology

Gothenburg
2-year master program (12 courses and a thesis) including 6 photonics-related courses specified below (4 pure photonics and 2 blended).
Contact : *Hans Hjelmgren − 031 772 17 37 − hans.hjelmgren@chalmers.se*
http://www.chalmers.se/en/education/programmes/masters-info/Pages/Wireless-Photonics-and-Space-Engineering.aspx

Electromagnetic waves and components
Chalmers University of Technology

Gothenburg
The aim of the course is to enhance the student's insight into the physical concepts and principles used to describe the generation and detection of electromagnetic waves, and their propagation through different types of media.
Contact : *Sheila Galt, Jörgen Bengtsson − 031 772 18 89 − sheila.galt@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23140

Wireless and photonics system engineering
Chalmers University of Technology

Gothenburg
The aim of the course is to treat the main ideas, methods, circuits, and components of microwave and photonic engineering from a system perspective, and thus give the overview system understanding required for a hardware engineer.
Contact : *Magnus Karlsson, Christian Fager, Hans Hjelmgren − 031 772 15 90 magnus.karlsson@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23323

Fundamentals of photonics
Chalmers University of Technology

Gothenburg
The aim of the course is to provide the student with an up to date knowledge of concepts and techniques used in modern photonics. Different physical models for light propagation are discussed, and they are implemented using modern numerical methods.
Contact : *Sheila Galt, Magnus Karlsson − https://www.student.chalmers.se/sp/course?course_id=23540*

Laser engineering
Chalmers University of Technology

Gothenburg
This course aims to efficiently introduce the main principles of laser physics and laser technology and to give a basic knowledge of the most commonly used laser types and their applications.
Contact : *Victor Torres-Company − 031 772 19 04 − torresv@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23758

Optoelectronics
Chalmers University of Technology

Gothenburg
This course aims to provide good understanding of semiconductor materials used in optoelectronics with a special emphasis on optical properties and processes, as well as components for generation, modulation and detection of light in the ultraviolet, visible and infrared.
Contact : *Anders Larsson, Johan Gustavsson − 031 772 15 93 − anders.larsson@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23327

Fiber optical communication
Chalmers University of Technology

Gothenburg
The aim of the course is to describe the components and concepts of fiber optical communication systems, combining theoretical descriptions with system aspects.
Contact : *Pontus Johannisson − 031 772 16 26 − pontus.johannisson@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23300

Nanotechnology (MPNAT)
Chalmers University of Technology

Gothenburg
2-year master program (12 courses and a thesis) including 2 photonics-related courses specified below (as well as optional courses in MPWPS).
Contact : *Elsebeth Schröder − 031 772 84 24 − elsebeth.schroder@chalmers.se*
http://www.chalmers.se/en/education/programmes/masters-info/Pages/Nanotechnology.aspx

Semiconductor Materials Physics
Chalmers University of Technology

Gothenburg
The aim of the course is both to give a broad overview of the semiconductor materials field, and an understanding of the physics of semiconductor materials as well as the properties of different types of hetero- and quantum-structures, their fabrication and characterization.
Contact : *Tommy Ive − 031 772 33 79 − tommy.ive@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23856

Modelling and Fabrication of Micro/Nano Devices
Chalmers University of Technology

Gothenburg
We aim to give the students an introduction to research and device fabrication in cleanroom environment, important for further activites both in research and industry related to micro- and nano-technology.
Contact : *Avgust Yurgens − 031 772 33 19 − avgust.yurgens@chalmers.se*
https://www.student.chalmers.se/sp/course?course_id=23925

Laser Spectroscopy
University of Uppsala

Uppsala
The course covers the properties of light, interaction of light with matter, the principles of lasers, different kinds of lasers.
Contact : *Burkhard Zietz − 018-471 3636 − burkhard.zietz@kemi.uu.se*
https://www.student.chalmers.se/sp/course?course_id=23925

Optics and photonics (1FA589)
University of Uppsala

Uppsala
The course gives a solid general introduction to optics and photonics and focuses on the emission, amplification, transmission, detection and application of light in a wide range of the electromagnetic spectrum – from ultraviolet, over the visible, to the infrared and terahertz.
Contact : *Vitaliy Goryashko − 076-2057 997 − vitaliy.goryashko@physics.uu.se*
http://www.uu.se/utbildning/utbildningar/selma/kurser/?kKod=1FA589&typ=1&la-sar=15/16

Technical wave physics
Luleå University of Technology

Luleå
Advanced course in wave physics focusing on optical measurement systems.
Contact : *Mikael Sjödahl − 0920-491220 − mikael.sjodahl@ltu.se*

Modern experimental metrology
Luleå University of Technology

Luleå
Hands-on course in the use of various optical measurement systems.
Contact : *Kerstin Ramser − 0920-491648 − Kerstin.Ramser@ltu.se*

Modern experimental metrology
Luleå University of Technology

Luleå
Hands-on course in the use of various optical measurement systems.
Contact : *Kerstin Ramser − 0920-491648 − Kerstin.Ramser@ltu.se*

DOCTORAL

Several courses each semester. Eg.:
- Spectroscopic ellipsometry
- Mueller matrix optics
- Optical Response of Materials
- Polarized Light
- Principles, Instrumentation, Measurements and Analysis with ellipsometry
- Reflection and Transmission Optics
- Photoelectron Spectroscopy and its applications
- Imaging and ubiquitous biosensing
- Introduction to cathodoluminescence spectroscopy
Linköping University

Linköping
Contact : *http://www.ifm.liu.se/edu/graduate/courses/*

Physics of Biomedical Microscopy (SK3500)
Royal Institute of Technology

Stockholm
Basic optical layout of the light microscope. Aberrations. Microscope objectives. Magnification. Numerical aperture. Microscope photometry. Detectors. Noise. Contrast methods (fluorescence, phase contrast, DIC). Resolution. Fourier methods. Optical transfer functions. Three-dimensional imaging in microscopy. Sampling and reconstruction of image data. Confocal microscopy. A brief introduction to tunnel and atomic force microscopy, electron microscopy, scanning near-field optical microscopy and X-ray microscopy.
Contact : *Kjell S Carlsson – +46 8 553 781 32 – kjellc@kth.se*
http://www.kth.se/student/kurser/kurs/SK3500?l=en

Laser Physics (SK3400)
Royal Institute of Technology

Stockholm
Essentials of quantum-mechanical description of the of the interaction between photons and electrons in optical gain media.
Basic properties of lasers and photon amplifiers.
Physical principles of laser action.
Essential knowledge of laser building blocks.
Overview of the most important laser types.
Contact : *Valdas Pasiskevicius – +46 8 553 781 55 – vp@kth.se*
http://www.kth.se/student/kurser/kurs/SK3400?l=en

Physics of Biomedical Microscopy, Extended Course (SK3501)
Royal Institute of Technology

Stockholm
Basic optical layout of the light microscope. Aberrations. Microscope objectives. Magnification. Numerical aperture. Microscope photometry. Detectors. Noise. Contrast methods (fluorescence, phase contrast, DIC). Resolution. Fourier methods. Optical transfer functions. Three-dimensional imaging in microscopy. Sampling and reconstruction of image data. Confocal microscopy. A brief introduction to tunnel and atomic force microscopy, electron microscopy, scanning near-field optical microscopy and X-ray microscopy.
Contact : *Kjell S Carlsson – +46 8 553 781 32 – kjellc@kth.se*
http://www.kth.se/student/kurser/kurs/SK3501?l=en

Fourier Optics (SK3340)
Royal Institute of Technology

Stockholm
The overall aim of the course is that you should be able to analyze optical problems with the help of the approximations made in Fourier optics and develop simple numerical simulations for your systems.
Contact : *Ulrich Vogt – +46 8 553 788 89 – uvogt@kth.se*
http://www.kth.se/student/kurser/kurs/SK3340?l=en

Fluorescens Spectroscopy for Biomolecular Studies (SK3521)
Royal Institute of Technology

Stockholm
This course covers methods in fluorescence spectroscopy that are used to study biomolecules and their interactions.
Contact : *Jerker Widengren – +46 8 553 780 30 – wideng@kth.se*
http://www.kth.se/student/kurser/kurs/SK3521?l=en

Nonlinear Optics (SK3420)
Royal Institute of Technology

Stockholm
- Course main content: Nonlinear interaction between a light field and matter.
- Perturbation calculations.
- Strong EM-fields.
- Quantum mechanical calculations.
- Crystallography.
- Block equation.
- Application of nonlinear optics.

Contact : *Valdas Pasiskevicius – +46 8 553 781 55 – vp@kth.se*
http://www.kth.se/student/kurser/kurs/SK3420?l=en

Nonlinear Optical Technology (SK3421)
Royal Institute of Technology

Stockholm
Introduction to nonlinear optics, resonant and nonresonant processes, nonlinear optical material and applications, ultrashort optical pulses, nonlinear optical fibers, Raman and Brilloin scattering, nonlinear waveguides and photorefraction and optical damage in materials.
Contact : *Valdas Pasiskevicius – +46 8 553 781 55 – vp@kth.se*
http://www.kth.se/student/kurser/kurs/SK3421?l=en

Introduction to Scanning Probe Microscopy (SK3740)
Royal Institute of Technology

Stockholm
To provide the theoretical background and physical intuitation necessary to understand how SPM's operate and how to interpret the images they produce. To provide an practical, hands-on introduction to the operation of SPMs in a laboratory setting.
Contact : *David B Haviland – +46 8 553 781 37 – haviland@kth.se*
http://www.kth.se/student/kurser/kurs/SK3740?l=en

Quantum Electronics (SK3600)
Royal Institute of Technology

Stockholm
After the course, the student should understand and have knowledge in quantum optics, lasers, optical modulators, detectors and waveguides, nonlinear and ultrafast optics so to be able to solve, with the necessary literature, practical and theoretical problems within the given fields.
Contact : *Gunnar G E Björk & Katia Gallo – +46 8 790 40 80 – gbjork@kth.se / gallo@kth.se – http://www.kth.se/student/kurser/kurs/SK3600?l=en*

Optics of the Human Eye (SK3370)
Royal Institute of Technology

Stockholm
The overall goal of this course is to give the student an understanding of the optical properties and function of the human eye.
Contact : *Peter Unsbo – +46 8 553 781 28 – pu@kth.se*
http://www.kth.se/student/kurser/kurs/SK3370?l=en

Technical Photography (SK3380)
Royal Institute of Technology

Stockholm
Optical imaging. Photographic lenses. Photometry. The camera. Photographic film. Digital cameras. Electronic imaging sensors. Tone reproduction. Color photography. Photographic prints. X-ray, ultraviolet and infrared photography. High speed photography. Imaging quality.
Contact : *Kjell S Carlsson – +46 8 553 781 32 – kjellc@kth.se*
http://www.kth.se/student/kurser/kurs/SK3380?l=en

Neurophysiology of Vision (SK3371)
Royal Institute of Technology

Stockholm
Basic anatomy of the retina, the lateral geniculate nucleus, and the striate cortex (primary visual cortex, V1). The physiological processes of photochemistry, transduction, and visual signal processing through photoreceptors, horizontal, bipolar, and ganglion cells. Receptive field profiles and selectivity of different cells to different stimulus properties such as spatial frequency, phase, orientation, and temporal movement. Spatial and temporal contrast sensitivity and visual acuity. Spatial frequency channels. Adaption. Aftereffects.
Contact : *Linda Lundström – +46 8 553 782 12 – lindafr@kth.se*
http://www.kth.se/student/kurser/kurs/SK3371?l=en

Super Resolution Microscopy (SK3514)
Royal Institute of Technology

Stockholm
Aquire extended knowhow on how all superresolution techniques work (SIM, STED, dSTORM, PALM) and how to apply them in biological research (pros & cons).
Contact : *Hans Blom – 08-52481214 – hblom@kth.se*
http://www.kth.se/student/kurser/kurs/SK3514?l=en

Seminar CourSeminar Course in Laser Safetyse in Laser Safety (SK3415)
Royal Institute of Technology

Stockholm
The course brings up the function of different lasers, classification of lasers, biological effects of laser radiation, basic safety rules, use of protective equipment and control of related hazards including electrical safety and fire safety and emergency response procedures. The examination with seminars and discussions in connection with the seminars train the student's communicative skills.
Contact : *Fredrik Laurell – +46 8 553 781 53 – flaurell@kth.se*
http://www.kth.se/student/kurser/kurs/SK3415?l=en

X-ray Physics and Applications
Royal Institute of Technology

Stockholm
Part 1: X-ray basics
X-ray interaction with matter, X-ray sources, X-ray optics, X-ray detectors
Part 2: Application examples and special topics.
Contact : *Ulrich Vogt – +46 8 553 788 89 – uvogt@kth.se*
http://www.kth.se/student/kurser/kurs/SK3550?l=en

Optical Design (SK3330)
Royal Institute of Technology

Stockholm
Geometrical optics, aberration theory, evaluation of optical systems, ray-tracing using commercial software, methods of optical design.
Contact : *Anna Burvall – +46 8 553 788 51 – anna.burvall@biox.kth.se*
http://www.kth.se/student/kurser/kurs/SK3330?l=en

Nanophotonics and Bionanophotonics
Royal Institute of Technology

Stockholm
This course has been developed in parallel with the fast-advancing multidisciplinary research and technological developments in the field of nanophotonics and bionanophotonics, and addresses three main areas.
Contact : *Ying Fu – +46 8 524 848 89 – fu@kth.se*
http://www.kth.se/student/kurser/kurs/SK3560?l=en

Laser Physics (SK3410)
Royal Institute of Technology

Stockholm
Physical background of lasers. The laser cavity. The laser medium. Mode-controlled techniques. The properties of coherent laser light. The time- and spatial-dependent behavior of lasers.
Contact : *Fredrik Laurell – +46 8 553 781 53 – flaurell@kth.se*
http://www.kth.se/student/kurser/kurs/SK3410?l=en

Laser Physics - Advanced Course (SK3411)
Royal Institute of Technology

Stockholm
Physical background of lasers. The laser cavity. The laser medium. Mode-controlled techniques. The properties of coherent laser light. The time- and spatial-dependent behavior of lasers.
Contact : *Fredrik Laurell – +46 8 553 781 53 – flaurell@kth.se*
http://www.kth.se/student/kurser/kurs/SK3411?l=en

Photonic Devices and Circuits
Chalmers University of Technology

Gothenburg
(jointly with KTH)
Contact : *Anders Larsson, Shumin Wang – 031 772 15 93*
anders.larsson@chalmers.se

Quantum Semiconductor Heterostructures
Chalmers University of Technology

Gothenburg
(jointly with KTH)
Contact : *Shumin Wang*

Nonlinear Fiber Optics
Chalmers University of Technology

Gothenburg
(jointly with KTH)
Contact : *Magnus Karlsson – 031 772 15 90*
magnus.karlsson@chalmers.se

Polarization Effects in Fibers
Chalmers University of Technology

Gothenburg
(jointly with KTH)
Contact : *Magnus Karlsson – 031 772 15 90*
magnus.karlsson@chalmers.se

Advanced Measurement Techniques
Chalmers University of Technology

Gothenburg
(jointly with KTH)
Contact : *Victor Torres-Company – 031 772 19 04*
torresv@chalmers.se

Semiconductor Physics
Chalmers University of Technology

Gothenburg
(jointly with KTH)
Contact : *Tommy Ive, Anders Larsson – 031 772 33 79*
tommy.ive@chalmers.se

Laser Spectroscopy
University of Uppsala

Uppsala
The course covers the properties of light, interaction of light with matter, the principles of lasers, different kinds of lasers. Applications of lasers in spectroscopy in chemistry, physics and biology, especially time-resolved (and ultrafast) methods.
Contact : *Burkhard Zietz – 018-471 3636*
burkhard.zietz@kemi.uu.se

Electrodynamics
Luleå University of Technology

Luleå
Fundamental course in EM-fields.
Contact : *Mikael Sjödahl – 0920-491220 – mikael.sjodahl@ltu.se*

Imaging
Luleå University of Technology

Luleå
Principles of advanced imaging and techniques.
Contact : *Mikael Sjödahl – 0920-491220 – mikael.sjodahl@ltu.se*

Correlation optics
Luleå University of Technology

Luleå
Principles of random optical fields and techniques.
Contact : *Mikael Sjödahl – 0920-491220 – mikael.sjodahl@ltu.se*

OTHER

One-Year Master Program in Solar Energy Engineering
Dalarna University

Borlänge
The one-year program focuses on the needs of the solar industry. Core courses are in Photovoltaics, Solar Thermal and Passive Solar Engineering. Typically, the program concludes with a 15 credit thesis.
Contact : *Frank Fiedler − 46778711 − ffi@du.se*
www.du.se/en/solar

Two-Year Master Program in Solar Energy Engineering
Dalarna University

Borlänge
The two-year program builds on the courses from the one-year program, going deeper into a number of solar topics while also broadening the student's perspective with regards to the role of Solar Energy in local, national and global energy systems. The program prepares students for an academic career.
Contact : *Frank Fiedler − 46778711 − ffi@du.se*
www.du.se/en/solar

Photonics4All is a European Horizon 2020 Outreach project, funded by the European Commission to promote photonics and light based technologies to young people, entrepreneurs and the general public across the EU. Photonics4all's unique selling point is that it will both develop a set of new promotional tools and apply them during a wide variety of outreach activities with different audiences.

Discover our unique approach and check out our tools and events : http://photonics4all.eu/.

Photonics4All
Discover the Power of Light