

Photonics and Nanotechnology

Basic information

Sivuaine suomeksi: Fotoniikka ja nanoteknologia

Biämne på svenska: Fotonik och nanoteknologi

Code: ELEC30XX

Extent: 25 ECTS

Language: English

Responsible professors: Markku Sopanen, Ilkka Tittonen, Harri Lipsanen, Hele Savin, Zhipei Sun, Erkki Ikonen, Esa Kallio

Prerequisites / Esitietovaatimukset / Förkunskaper: ELEC-E4130 Electromagnetic fields, ELEC-E3140 Semiconductor physics, and ELECE9111 Mathematical Computing, or equivalent knowledge.

Content and structure of the minor

The main goal of this minor is to give the student sufficient theoretical and practical skills in physics, electromagnetic radiation, modeling, optics, and in materials-related topics to master the general physical phenomena that can be applied from nanosciences up to space physics. The curriculum can be personalized according to the student's particular field of interest.

Minor students can focus in one of the following areas: Nanotechnology, Photonics or Advanced Materials. Micro- and Nanotechnology focuses on operational principles and fabrication techniques of devices, *e.g.*, LEDs, diode lasers, solar cells and nanoelectronic devices. Photonics focuses on production, guiding, modulation and detection of light. Advanced Materials focuses especially on nanoscale semiconductors, functional materials, emerging new materials, like graphene and other 2D materials, and their applications.

The student is expected to gain such a good knowledge in natural sciences that it enables understanding the basic physical and natural processes behind modern high-technology devices and materials. The student can also apply these principles to design and invent novel applications utilizing, *e.g.*, nanotechnology.

Code	Name	Credits	Teaching period
Choose 25 ECTS		25	
ELEC-E9250	Advanced physics and applications of optical fibers L V	5	
ELEC-E3120	Analysis and Design of Electronic Circuits	5	I-II
ELEC-E4130	Electromagnetic Fields	5	I-II
ELEC-E9111	Mathematical Computing	5-7	I-II
ELEC-E4810	Metamaterials and Nanophotonics	5	I-II
CHEM-E5115	Microfabrication	5	III-IV
ELEC-E3280	Micronova Laboratory Course	5	I-II
ELEC-E3290	Micronova Special Assignment	5	I-V
ELEC-E3230	Nanotechnology	5	IV
ELEC-E3250	Optical Fibers: Physics and Applications L	5	II
ELEC-E5730	Optics	5	III
ELEC-E3210	Optoelectronics	5	III
ELEC-E3240	Photonics	5	V

ELEC-E3220	Semiconductor Devices	5	III
ELEC-E3140	Semiconductor Physics	5	I-II
ELEC-E4520	Space Physics	5	IV-V
PHYS-C0220	Thermodynamics and Statistical Physics	5	IV
