Name of the course	**Semiconductor materials**
Number of instruction hours	20
Outline of course/module content	The theory of energy bands in the condensed state: quantum wave mechanics and waves of matter, the energy of electrons, application of the energy band theory (isolators, semiconductors, metals). Free electrons in emtals: the model of free electrons, Fermi-Dirac distribution, the energy distribution of electrons, electric and thermal conductivity of metals. Electrons and holes - charge carriers in semiconductors. Semiconductor doping, electronic structure and conductivity of doped semiconductors. Determination of the conductivity type, optical methods, Hall's effect. Organic semiconductors: electronic structure, charge carriers (soliton, polaron), physical properties, conductivity. Semiconductor-electrolyte contact: the space charge layer, Schottky barrier, the flat band potential, reactions at phase boundaries involving ion transfer, reactions at the phase boundary involving charge transfer. Semiconductor - metal contact: correction properties (resistance theory), diode, semiconductor diode, transistor. Energy conversion: photopotential effects at the contact metal/semiconductor, photopotential cells. Selected examples and research techniques: the general electric and optical properties: styrene, polypirrole, perylene, anthracene, silicium, germanium; binary complexes of the elements from the third and fifth group (galium-antimonide, galium-arsenide, indium-antimonide, indium-phosphide).
Description of instruction methods	Lectures, essay, Laboratory: Three exercises related to the topics discussed in the lectures.
Description of course/module requirements	Laboratory/essay, oral exam.