

Level: PhD				
Course title: Spectroscopy of condensed matter				
Status: elective				
ECTS: 15				
Requirements:				
Learning objectives Introducing students to the field of characterization and examination of spectroscopic properties of materials. Acquiring up-to-date knowledge in the field of spectroscopy of condensed matter.				
Learning outcomes After completing the course, students should have developed: <ul style="list-style-type: none"> - Knowledge of specifics of certain types of materials in condensed state; - Capability of reading professional literature and preparation of scientific presentations; - Ability to independently perform measurements and experiments for characterization of materials; - Ability to realize certain technical solutions. 				
Syllabus				
<i>Theoretical instruction</i>				
Light sources, spectral decomposition of light (optical filters, monochromators and spectrometers, interferometers). Detection of electromagnetic radiation. Photomultipliers and photoelectric detectors. Spectroscopy in the visible range of EM radiation. Optical absorption (fundamental, impurity); luminescence. Light scattering. Raman scattering, calculation of the intensity of Raman scattering, Raman tensor; Raman scattering in disordered systems; Resonance Raman scattering. Brillouin and Rayleigh scattering. Intensity of infrared spectroscopy. The absorption at the electronic and vibrational transitions. Fourier infrared and Raman spectroscopy. Basic principles and experimental setting. Spectroscopy of nanoscopic systems. <i>In situ</i> spectroscopy (absorption spectroscopy, infrared spectroscopy, Raman spectroscopy, NMR and EPR). Ultra-fast and femto spectroscopy.				
<i>Practical instruction</i>				
Application of the selected methods for characterization of spectroscopic properties of materials. Preparing and public presentation of seminars that accompany and supplement the course content.				
Weekly teaching load				Other:
Lectures: 4	Exercises:	Other forms of teaching:	Student research: 6	