Level: PhD	
Course title: Modern methods for the characterization of nanostructures	
Status: elective	
ECTS: 15	
Requirements:	

Learning objectives

Training students to perform some of the basic experimental methods and procedures in the characterization of nanomaterials and nanostructures.

Learning outcomes

Acquisition of knowledge and skills in analyzing and interpreting the results obtained in the characterization of nanostructured materials with different methods.

Syllabus

Theoretical instruction

Introduction to the basic principles of materials characterization. General classification methods of characterization. Nanomaterials and nanostructures. Diffraction, microscopic and spectroscopic characterization methods of nanostructures. X-ray diffraction. Scanning electron microscopy-SEM. Transmission electron microscopy-TEM. Scanning probe microscopy-SPM (scanning tunnelling microscopy STM). Introduction to luminescence. Classification of the most significant luminescent methods (photo-, hemi-, electro-, tribo-, radio-luminescence). The luminescent phenomena in nanomaterials. X-ray Fluorescence (XRF)-qualitative and quantitative determination of the materials composition. Vibrational spectroscopy (Infrared, Raman). Magnetic spectroscopy (nuclear magnetic resonance NMR, electron paramagnetic resonance-EPR). Methods for the characterization of thin films and analysis of results. Specificities in the interpretation of experimental results in the characterization of nanomaterials and nanostructures.

Practical instruction

Research work and preparation, and presentation of the seminar papers.

Weekly teaching load				Other:
Lectures: 6	Exercises:	Other forms of teaching:	Student research: 4	