

Level: PhD				
Course title: Physics of materials				
Status: elective				
ECTS: 30				
Requirements:				
Learning objectives Acquiring up-to-date knowledge about models and physical properties of condensed matter and application of advanced materials.				
Learning outcomes After completing the course, students should possess: <ul style="list-style-type: none"> - Scientifically based understanding of physical processes and interpretation of physical phenomena in condensed matter physics, - Ability to read professional literature and prepare scientific presentations, - Ability to participate in teaching as a demonstrator in this area, - Ability to transfer the acquired knowledge to other individuals and groups. 				
Syllabus <i>Theoretical instruction</i> Nature of chemical bonds. Principles of structural arrangements. Bond energy and parameters of phase transformations. Ordered systems. Influence of structural arrangements on material properties and examples of specific materials. Imperfections in the crystal. Structural imperfections. Point, line and volume defects and their influence on the properties of materials. Burgers vector. Thermodynamic theory of imperfections. Mass transport in crystals. Chemical defects (colour centres and electrical conductivity in ionic crystals). Disordered systems. Methods of obtaining, structure, physical and chemical properties and phenomenological physical processes of materials: <ul style="list-style-type: none"> - Superconducting compounds and alloys. Exotic superconductors. - Modern soft magnetic and hard magnetic materials. - Special ceramic materials. Rutile and ferroelectric ceramics. - Liquid crystals. Smectics, nematics and cholesteric. Mixtures of liquid crystals. - Polymeric materials. Crystalline and amorphous polymers. Quasicrystals. - Amorphous metals. Amorphous semiconductor materials. Glasses and thin films. <i>Practical instruction</i> Application of the selected experimental methods in characterization of materials. Preparation and public presentation of seminars that accompany and supplement the course content.				
Weekly teaching load				Other:
Lectures: 5	Exercises:	Other forms of teaching:	Student research: 15	