

Course title	FUNCTIONAL MATERIALS		
Teaching method	Lecture and five laboratory experiments		
Person responsible for the course	Dr. Hab. Janusz Typek	E-mail address to the person responsible for the course	typjan@zut.edu.pl
Course code (if applicable)		ECTS points	4
Type of course	Optional	Level of course	S1
Semester	Winter or sommer	Language of instruction	English
Hours per week	Lectures 2 ^h + lab 2 ^h	Hours per semester	Lecture 30 ^h + lab 30 ^h
Objectives of the course	Knowledge of basic classes of functional and multifunctional materials. Understanding of dependence of their specific properties on their structure. Ability of selection of materials and their structure for given practical applications.		
Entry requirements	Basic knowledge of solid materials and electromagnetism is expected. Knowledge of condensed matter physics on the level of typical undergraduate course is highly useful but not required.		
Course contents	Electronic structure of materials (band structure in crystalline solids, classification of materials based on their electronic structure). Semiconducting materials (basic properties of semiconductors, transport properties, heterostructures and their applications). Magnetic materials (magnetic ordering, magnetic materials: metals, alloys, ferromagnetic oxides, and compounds, magnetic resonance). Functional nanomaterials. Lab experiments with solar cells, ferroelectrics, ferromagnets, paramagnets.		
Assessment methods	Laboratory reports (75%) and home prepared essay on selected subject of lab experiments (25%).		
Recommended readings	<ol style="list-style-type: none"> 1. Handbook of Nanophysics: Functional nanomaterials, ed. Klaus D. Sattler, CRC Press 2011 2. Introduction to Condensed Matter Physics, F. Duan, J. Guojun, World Scientific 2005 		
Additional information	The group should be less than 10 students		