

<b>Study program:</b> Electrical Power Engineering			
<b>Type and level of studies:</b> Undergraduate Academic Studies			
<b>Course unit:</b> Materials in Electrical Engineering			
<b>Teacher in charge:</b> Jelena M. Purenovic			
<b>Language of instruction:</b> English			
<b>ECTS:</b> 6			
<b>Prerequisites:</b> -			
<b>Semester:</b> Winter			
<b>Course unit objective:</b> The mastery of fundamental knowledge about materials, primarily their structural characteristics, especially mechanical, thermal, electrical, and magnetic properties concerning their application in electrical engineering.			
<b>Learning outcomes of Course unit:</b> The possibility of optimal material selection in engineering practice, as well as the creation of new materials for special purposes.			
<b>Course unit contents:</b>			
<b>Theoretical classes</b> Physical-chemical foundations of material structure (chemical bonds, states of matter, crystal structure, defects). Classification of electrical materials. First and second-order conductors. Properties, types, and application of conductive materials. High electrical conductivity metals and their alloys. Low electrical conductivity metals. Superconducting materials. Conductive materials for special purposes. Semiconductors, physical aspects of semiconductor materials (energy bands, Fermi energy, specific electrical conductivity). Formation of p-n junction. Properties, types, and application of semiconductor materials. Dielectrics, basic dielectric properties. Division into insulating and capacitor dielectric materials. Classification of passive dielectrics. Active dielectric materials. Liquid crystals. Optical fibers. Magnetic materials, basic concepts of magnetism. Properties, types, and application of magnetic materials. Hysteresis loop. Magnetic losses. Soft magnetic materials. Magnetoceramics. Materials for making permanent magnets. Mechanical properties of materials. Tensile testing, fracture diagrams. Tensile strength, hardness, non-destructive testing methods.			
<b>Practical classes</b> Laboratory exercises: structural, mechanical, thermal, electrical, and magnetic properties of materials, non-destructive testing.			
<b>Literature:</b> [1.] William D. Callister, Jr., David G. Rethwish, Materials Science and Engineering An Introduction, 10 <sup>th</sup> edition, Wiley, 2017 [2.] S. L. Kakani, A. Kakani, Material Science, New Age International (P) Ltd., Publishers, 2004 [3.] Adrianus J. Dekker, Electrical engineering Materials, Prentice-Hall, Inc., 1959			
<b>Number of active teaching hours:</b> <b>4</b>	<b>Lectures:</b> 2	<b>Practice:</b> 2	
<b>Teaching methods:</b> Lectures, laboratory exercises, consultations			
<b>Evaluation (maximum number of points 100)</b>			
<b>Exam prerequisites:</b>	No. of points:	<b>Final exam:</b>	No. of points:
Activities during teaching process	5	Final exam (written):	55
Practical teaching	15	Final exam (oral):	
Colloquium	25		