

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Plastics, Ceramics and Composite Materials</b>		Code <b>1010642121010610409</b>
Field of study <b>Mechanical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>Mechatronics</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>1</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Leszek Małdziński, prof. nadzw. email: email: leszek.maldzinski@put.poznan.pl tel. tel. +4861 665-2238 FACULTY OF MACHINES AND TRANSPORT ul. Piotrowo 3 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Selected properties of polymers, ceramics and composites. Processing of polymers, ceramics and composites. Selected examples of practical application. The issue of selection of engineering materials for the construction of civil engineering structures.
2	<b>Skills</b>	The ability to acquire information from the literature and databases, making interpretation and justification reviews
3	<b>Social competencies</b>	The student is aware of the validity of technical activities, understands the need for the development and training
<b>Assumptions and objectives of the course:</b> Providing students with knowledge on: selected properties of polymers, ceramics and composites processing their application in practice. Selection of engineering materials for the construction of civil engineering structures.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Selected properties of polymers, ceramics and composites. Processing of polymers, ceramics and composites. Selected examples of practical application. The issue of selection of engineering materials for the construction of engineering structures - [-]		
<b>Skills:</b> 1. Student is able to correctly choose the material and processing technology for the typical working machine parts according to the latest engineering materials - [-]		
<b>Social competencies:</b> 1. The student is aware of the validity of technical activities, understands the need for greater knowledge of modern construction materials and machinery parts processing technology - [-]		
<b>Assessment methods of study outcomes</b>		
Written and oral assessment		
<b>Course description</b>		

Selected properties of polymers , ceramics and composites thereof evaluation: general properties (density , viscosity, melt index , mechanical properties (stress at yield , elongation at yield , tensile strength , tensile modulus , flexural strength ) , toughness ( method Charpyego , Isolde , hardness ( Rockwell , ball indentation method ) , property calf (softening temperature , deflection , point) , electrical properties , flammability .

Polymer processing: injection molding , extrusion molding , pressing, sprayings , blow molding , calendaring, foaming , casting, polymer compounding techniques .

Selected properties of ceramic materials ; dielectricity , poor electrical conductivity , resistance to thermal shocks , the asymmetry of the compressive strength and tensile

Processing of ceramic materials ; forming by rolling , drawing , leveling , compression blow molding , drawing glass fibers , isostatic pressing (e.g., a spark plug ) , squeezing through a screw press , turning ( in the form of gypsum and gypsum mold ) , die casting plaster .

Special ceramic materials and their properties and applied in industry: carbon fibers, diamond , nanotubes , fullerenes .

Special types of composites, their properties and application: metal matrix composites reinforced with particles , dispersion strengthening , based sintered non-ferrous metals , metal- ceramics, cemented carbides , cermets , composites fibrous layer composites .

Methods of making composites :

Selection of engineering materials chosen for the construction of engineering structures : for a beam on a mirror telescope on some parts of the car ( body kits , bumpers ) on the elements of houses (eg external walls - bearing ).

**Basic bibliography:**

1. Leszek. A. Dobrzański, ?Podstawy nauki o materiałach?, WNT, Gliwice 2006
2. Leszek. A. Dobrzański, ?Metaloznawstwo i obróbka cieplna? WNT, 1997
3. Karol Przybyłowicz, Janusz Przybyłowicz, ?Materiałoznawstwo w pytaniach i odpowiedziach? , Wydawnictwo Naukowo-Techniczne, 2004

**Additional bibliography:**

1. Michael Ashby i in.: ?Inżynieria materiałowa? tom I i II, Wydawnictwo Galaktyka, 2006
2. Michael Ashby i in.: ?Materiały inżynierskie? tom I i II, WNT, 1996
3. Poradnik Inżyniera: ?Obróbka cieplna metali?, WNT, 1979
4. Mały poradnik mechanika, tom I i II, WNT1999

**Result of average student's workload**

Activity	Time (working hours)	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	30	1
Practical activities	15	1