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| FACULTY: | **Faculty of Mechanical Engineering** |
| FIELD OF STUDY: | **Mechatronics** |
| ERASMUS COORDINATOR OF THE FACULTY: | Igor Maciejewski, DSc, PhD |
| E-MAIL ADDRESS OF THE COORDINATOR: | [igor.maciejewski@tu.koszalin.pl](mailto:igor.maciejewski@tu.koszalin.pl) |
| COURSE TITLE: | **Non-metal materials and nano-materials** |
| LECTURER’S NAME: | dr hab. inż. Mieczysław Pancielejko, prof. PK |
| E-MAIL ADDRESS OF THE LECTURER: | [mieczyslaw.pancielejko@tu.koszalin.pl](mailto:mieczyslaw.pancielejko@tu.koszalin.pl) |
| ECTS POINTS FOR THE COURSE:  COURSE CODE (USOS): | 2  0911>1400-MNiN |
| ACADEMIC YEAR: | 2022/2023 |
| SEMESTER:  (W – winter, S – summer) | Summer |
| HOURS IN SEMESTER: | 30 |
| LEVEL OF THE COURSE:  (1st cycle, 2nd cycle, 3rd cycle) | 1st cycle |
| TEACHING METHOD:  (lecture, laboratory, group tutorials, seminar, other-what type?) | Lectures (30h) |
| LANGUAGE OF INSTRUCTION: | English |
| ASSESSMENT METOD:  (written exam, oral exam, class test, written reports, project work, presentation, continuous assessment, other – what type?) | Written exam/test |
| COURSE CONTENT: | Classification of materials by chemical bonding. Crystalline and amorphous materials. Classification of engineering materials.  Definition and structure of polymers. Natural, synthetic and modified polymers. Mechanisms of addition and condensation polymerization. Amorphous and crystalline polymers. Thermoplastics and duroplastics - properties and applications. Processing and functional additives to polymers. Biodegradable polymers. Waste management - recycling. Definition of ceramic materials. Mechanisms of sintering. Natural and processed ceramics. Technical ceramics. Influence of structure on mechanical, electrical and thermal properties of ceramics. Types and uses of ceramic materials: carbides, oxides, nitrides, sialons, cermets, silica, glasses and glass ceramics.  Definition of composite materials. The role of binding and reinforcing phase in composites. Types and general characteristics of matrix materials and reinforcing elements in composite materials. Properties and applications of composites. Definition of nanomaterials. Natural sources of nanoparticles. Engineered nanomaterials: metallic, ceramic and nanocomposites. Structure and properties of nanomaterials. Nanolayers. Carbon nanostructures. Application areas of nanomaterials and threats to the environment and humans. |
| ADDITIONAL INFORMATION: | Students should know the fundamentals of solid state physics and chemistry. Knowledge of atomic structure and types of chemical bonds is required. |