УНИВЕРЗИТЕТ У БАЊОЈ ЛУЦИ
UNIVERSITY OF BANJA LUKA
ПРИРОДНО-МАТЕМАТИЧКИ ФАКУЛТЕТ
FACULTY OF NATURAL SCIENCES AND MATHEMATICS

CHEMISTRY DEPARTMENT | PhD STUDIES

Course name	Polymer Nanocomposites and Hybrid Materials			
Course code	**Course status**	**Semester**	**Hours of instruction**	**ECTS**
DHEM23PNM	**elective**	**I, II, III or IV**	**5+0**	**10**
Teacher(s)	**Assoc. Prof. Dr. Miroslav Huskić**			

Prerequisite course(s)	**Entry requirements**
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Course goals

The goal is to provide students with in-depth knowledge of part of the increasingly important field of nanotechnology, which is closely related to polymer science, which includes polymer nanocomposites and hybrid materials. Preparation methods, possible applications, and some health issues or concerns related to nanoparticles will be presented.

Learning outcomes

Students will obtain knowledge about polymer nanocomposites, methods of their preparation and characterization, their properties, and possible and actual applications. They will understand the correlations between the type, size, and shape of the nanoparticles with the nanocomposite properties

Course content

- Polymeric/elastomeric composites, nanocomposites, hybrid materials and their comparison
- Nanofillers: types, structure, shape (spherical nanoparticles – three-dimensional structures, layered nanoparticles - two-dimensional structures, one-dimensional structures: nanotubes, nanowires, nanorods, nanofibers, etc.), size, basic properties, role in nanocomposites.
- Preparation methods of various nanofillers and techniques of composites and hybrid characterization
- Chemical and physical modification of nanoparticles
- Preparation of nanocomposites. The influence of different parameters on the preparation of composites
- Morphology of nanocomposites: Surface properties and impact of the interphase between polymer and nanofiller on nanocomposite properties
- Mechanical and thermal properties, wear and heat resistance, permeability, flammability, electrical and optical properties, durability, etc.
- Nanocomposites with carbon nanomaterials, layered silicates, inorganic oxide, metallic nanoparticles, etc.
- Hybrid materials; types, methods of preparation, applications of polymer nanocomposites and hybrid materials
- The impact of nanomaterials on health and the environment

Teaching methods

Lectures. Case studies. Literature overview based on the given topic.

Books and other learning materials

- Text prepared by the lecturer.
- Science and applications of Tailored Nanostructures, Publisher: One Central Press. Editor: Professor Paolo Di Sia
- Nanocomposites – New trends and developments, Publisher: InTech, Editor: Farzad Ebrahimi

Course activities and grading method

Oral exam

Research work	**40**	**Final exam**	**60**

Additional course notes

Name of the teacher who prepared this form	**Miroslav Huskić**

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