

E – Charakteristika studijního předmětu					
Název studijního předmětu	Aplikace nanotechnologií v medicíně				
Typ předmětu	povinný		dopor. ročník / semestr	2/Z	
Rozsah studijního předmětu	2+1	hod. za týden	3	kreditů	5
Jiný způsob vyjádření rozsahu					
Způsob zakončení	zkouška		Forma výuky	přednáška, cvičení	
Další požadavky na studenta					
Vyučující	Dr. Katarzyna Miturova				
Stručná anotace předmětu					
1. Introduction to anatomy, physiology and biochemistry of human body – holistic view. Basic information about human body regarding the presence of nanostructures, and possibilities of applications of nanoimplants.					
2. Introduction to nanomaterials and nanotechnology in medicine. What is the basic problem with the size nano-? What types of nanomaterials are best for human organism? Carbon biomaterials in nanotechnology.					
3.-4. Introduction to different branches of medicine. Overview of cardiosurgery, orthopaedy, dental surgery, thoracosurgery, neurosurgery, maxillofacial surgery, laryngology, ophthalmology as a potential area for nanotechnology in medicine.					
4.- 5. Medical implants. Application of carbon nanomaterials in cardiosurgery, orthopaedy, neurosurgery in nano-scale. What is original about it?					
6. – 7. Nanotechnology in laryngology Basic information about the audiology and auditory implants.					
8. – 9. Nanotechnology in ophthalmology. Artificial lens and contact lenses – applications of carbon and polymer nanomaterials. Nanotools.					
10.-11. Nanocrystalline Diamond Coatings (NCD) and Diamond Powder Particles (DPP) – nanotechnologies in medicine. Presentation of medical implants with nanolayer and the processes of its manufacturing. Diamond nanopowder in human organism – examinations in vitro, in vivo and clinical research – presentation of results.					
12. Diamond nanopowder. Discussion about potential application of this material in medicine. Includes the film “Biology of Cell”. Drug delivery.					
13. Treatments by nanotechnology. Examples of nanotechnology now and possibilities for future in medicine.					
14. Nanotechnology in transplants. Special properties of new materials, new methods for testing of nanomaterials in transplantology.					
Studijní literatura a studijní pomůcky					
R. A. Freitas Jr., Nanomedicine: Biocompatibility, Texas, USA 2003.					
K. Bakowicz-Mitura: „Bioaktivita diamantu“, Jemná Mechanika a Optika, (2007), 3, 67-68.					
S. Mitura, P.Niedzielski, B. Walkowiak (editors), Nanodiam, PWN, Warszawa 2006.					
K. Bakowicz: “Bioactivity of Diamond”, Doctor Thesis, Technical University of Lodz, 2003.					