

Załącznik Nr 5 do Zarz. Nr 33/11/12

(faculty stamp)

COURSE DESCRIPTION

Z1-PU7

WYDANIE N1

Strona 1 z 2

1. Course title: Nanomaterials in medicine		2. Course code		
3. Validity of course description: 2018/2019				
4. Level of studies: MSc programme				
5. Mode of studies: intramural studies				
6. Field of study: CHEMISTRY		(FACULTY SYMBOL) RCH		
7. Profile of studies: academic				
8. Programme: Pharmaceutical and cosmetic chemistry				
9. Semester: 1st				
10. Faculty teaching the course: Department of Organic Chemistry, Bioorganic Chemistry and Biotechnology				
11. Course instructor: Dr Slawomir Boncel, PhD DSc Eng, prof. SUT				
12. Course classification: speciality				
13. Course status: elective				
14. Language of instruction: English				
15. Pre-requisite qualifications: fundamentals of physics, including solid state physics; general chemistry - structure of matter, relationship between molecular structure and physicochemical properties; allotropy; organic and inorganic chemistry - reactions and their mechanisms				
16. Course objectives: Acquiring knowledge about the basics of nanotechnology and nanomedicine from both theoretical and practical side; synthesis and physicochemical / biological properties of nanomaterials in the context of differences / advantages resulting from the size of nanoparticles in the biomedical applications				
17. Description of learning outcomes:				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	The student has an extended knowledge in the field of chemistry of macromolecular compounds, including the impact of biological and / or practical application	Test	Lecture	K_W03 (+++)
2.	The student has a general knowledge about current development trends and the newest discoveries in the field of chemistry and related sciences	Test	Lecture	K_W11 (+++)
3.	The student has an extended knowledge about, synthesis, purification and analysis of mixtures of chemical compounds using classical and instrumental methods	Test	Lecture	K_W04 (++)
4.	The student can apply the knowledge acquired in the field of chemical sciences to the related fields of science and scientific disciplines	Presentation	Seminar	K_U08 (+++)
5.	The student has the ability to prepare oral presentations regarding specific issues within the specialty subjects or diploma seminar	Presentation	Seminar	K_U10 (++)
6.	The student uses specialist, English terminology in the field of sciences chemical	Presentation	Seminar	K_U13 (+++)
7.	The student understands the need to systematically get acquainted with scientific and popular science journal what is basic for chemistry and science in order to expand and deepen the knowledge	Presentation	Seminar	K_K05 (++)

18. Teaching modes and hours

Lecture 15 / MSc Seminar 15

19. Syllabus description:

Lecture

1. Nano-scale matter - basic concepts and definitions; phenomena and physicochemical/biological properties accompanying the transition of matter dimensions from macro- to nanoscale (4 h)
2. Synthesis of nanomaterials for medicine - 'wet' methods, bottom-top synthesis by means of organic chemistry, catalytic chemical vapor deposition, electric arc discharge, plasma methods, laser ablation, electrochemical methods and others. (4 h)
3. Biomedical applications of nanomaterials: drug delivery systems, theranostics, cell growth scaffolds, nanosurgery, etc. (5 h)
4. Summary of the lecture series, interactive lecture, discussion, future of nanomedicine (1 h)

Seminar

The student gives, after prior critical elaboration and preparation of materials, a multimedia presentation on selected topics that refers thereto and deepens the content of the lecture.

20. Examination: no

21. Primary sources:

1. *Nanomedicine*, Volume I: Basic Capabilities, Robert A. Freitas Jr., Landes Bioscience, Texas **1999**, USA
2. *Biomaterials, A Nano Approach*, S. Ramakrishna, M. Ramalingam, T. S. Sampath Kumar, W. O. Soboyejo, CRC Press, Taylor and Francis Group, Boca Raton **2010**, USA
3. *Cancer nanomedicine: progress, challenges and opportunities*, Nature Reviews Cancer **2017**, 17, pages 20–37.
4. The newest articles from *Nanomedicine*
5. The newest articles from other JCR journals

22. Secondary sources:

1. *Introduction to Nano. Basics to Nanoscience and Nanotechnology*, Amretashis Sengupta, Chandan Kumar Sarkar, Springer-Verlag Berlin Heidelberg, **2015**
2. *Handbook of Carbon Nano Materials*, vol. 1 & 2, pod red. F. D'Souza, K. M. Kadish, World Scientific, Singapore **2011**
3. *Carbon-Based Nanomaterials, Essentials in Nanoscience and Nanotechnology*, Narendra Kumar, Sunita Kumbhat, John Wiley & Sons, Inc., **2016**

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/15
2	Classes	15/15
3	Laboratory	0/0
4	Project	0/0
5	BA/ MA Seminar	5/5
6	Other	0/30
	Total number of hours	35/65

24. Total hours: 35/65 (100)

25. Number of ECTS credits: 3

26. Number of ECTS credits allocated for contact hours: 1

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 0

26. Comments: Passing the semester is achieved on the basis of the points obtained from the final test (the student must get 51% of the total points) and the positively assessed presentation of the selected issue on the last lecture.

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)