

(faculty stamp)

COURSE DESCRIPTION

Z1-PU7

WYDANIE N1

Strona 1 z 2

1. Course title: SMART POLYMERS			2. Course code	
3. Validity of course description: 2016/2017				
4. Level of studies: 2 nd cycle of higher education				
5. Mode of studies: intramural studies				
6. Field of study: INDUSTRIAL ENGINEERING CHEMISTRY			(FACULTY SYMBOL) RCh4	
7. Profile of studies:				
8. Programme: NANOMATERIALS AND FINE CHEMICALS, PROCESS ENGINEERING FOR GREEN CHEMICAL TECHNOLOGIES				
9. Semester: II				
10. Faculty teaching the course: Department of Physical Chemistry and Technology of Polymers (RCh-4)				
11. Course leader: Dorota Neugebauer, DSc, associate professor				
12. Course classification: core engineering				
13. Course status: compulsory				
14. Language of instruction: English				
15. Pre-requisite qualifications: Organic chemistry, Introduction to plastics				
16. Course objectives: The fundamental knowledge in „intelligent” polymers as a group of macromolecules with special properties and common applications.				
17. Description of learning outcomes:				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Student has knowledge about modern polymer materials used in the various areas of life	Passing Test	Lecture	K_W04 (+), K_W07 (+++), K_K02 (+)
2.	Student can identify the kind of stimulus responsible for change behavior of the “smart” polymers	Passing Test	Lecture	K_W02 (++)
3.	Student is aware of the use of plastic production with respect of the environment protection (recycling)	Passing Test Oral Presentation	Lecture Seminar	K_W06 (+), K_W09 (+++), K_U12 (++) K_U16 (+)
4.	Student is able to prepare and present an oral	Oral Presentation	Seminar	K_U06 (++) K_K07 (+)
5.	Student is able to analyze and discuss on the presented topics	Oral Presentation	Seminar	K_U04 (++)
18. Teaching modes and hours				
Lecture / BA /MA Seminar / Class / Project / Laboratory				
Lec 15 h., Sem - 15 h				
19. Syllabus description:				
Lectures: Basic terms and definitions. Biodegradable polymers and plastics (basic definitions and motivation). Stimuli responsive polymers (SRP). Thermo-, electro- and photochromic polymers. Light-emitting polymers (LEP). Shape memory polymers. Piezoelectric polymers. Electroactive polymers. Self-healing/repairing polymers. Self-cleaning polymeric coatings. Liquid crystal polymers. Energy harvesting materials. Composites and polymers functionalized with carbon materials (fullerene, carbon nanotubes). Photovoltaic cells.				
Seminars: Students give short presentations about common plastics as well as based on scientific regular and review articles published in area of smart polymers in the current academic year.				
20. Examination: no				

21. Primary sources:

1. J. Rodriguez-Hernandez, F. Checot, Y. Gnanou, S. Lecommandoux "Toward 'smart' nano-objects by self-assembly of block copolymers in solution" Prog. Polym. Sci. 30 (2005) 691–724
2. M.R.Aguilar, C. Elvira, A. Gallardo, B. Vázquez, and J.S. Román "Smart Polymers and Their Applications as Biomaterials" Topics in Tissue Engineering Vol. 3, Chap. 6, 2007. Eds. N Ashammakhi, R Reis & E Chiellini
3. N. Kumar, M.N.V. Ravikumar, A.J. Domb "Biodegradable block copolymers" Advanced Drug Delivery Reviews 53 (2001) 23–44
4. L.S. Nair, C.T. Laurencin "Biodegradable polymers as biomaterials" Prog. Polym. Sci. 32 (2007) 762–798
5. L. Akcelrud "Electroluminescent polymers" Prog. Polym. Sci. 28 (2003) 875–962
6. S.H. Cho, S.R. White, P.V. Braun "Self-Healing Polymer Coatings" Adv. Mater. 21 (2009) 645–649
7. A. Kumar, A. Srivastava, I.Y. Galaev, B. Mattiasson "Smart polymers: Physical forms and bioengineering applications" Prog. Polym. Sci. 32 (2007) 1205–1237

22. Secondary sources:

The newest articles describing smart polymers.

23. Total workload required to achieve learning outcomes

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

24. Total hours:60**25. Number of ECTS credits: 2****26. Number of ECTS credits allocated for contact hours: 1****27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):-****26. Comments:-**

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)