(facul	ty stamp) COURSE DESCR	PTION	Z1-PU7	WYDANIE N1	Strona 1 z 2	
1. C	ourse title: ADVANCED CERAMICS COMPOSITES	AND	2. Course code	9		
NAN	IOCOMPOSITES					
3. Va	alidity of course description: 2018/2019					
4. Le	evel of studies: 2 <sup>nd</sup> cycle of higher education					
5. M	ode of studies: intramural studies					
6. Fi	eld of study: INDUSTRIAL ENGINEERING CHEMIS	TRY	(RCH)			
7. Pi	rofile of studies: general					
8. Pi	rogramme: Nanomaterials and Fine Chemicals					
9. Se	emester: 2					
10. F	Faculty teaching the course: Department of Physic	al Chemistry and Techno	ology of Polymer	S		
11. (	Course instructor: Anna Mielańczyk, PhD					
12. (	Course classification:					
13. (	Course status: elective					
14. L	anguage of instruction: English					
15. F	Pre-requisite qualifications: -					
16. 0	Course objectives: The course aims to acquaint st	udents with methods of p	production, proc	essing and appl	ication of selected	
cera	mic materials, composites and nanocomposites. T	The scale of their product	tion increases fr	om year to year	and without them	
mod	lern technology, medical sciences and other fields	, important for civilization	n could not be d	eveloped.		
17. [	Description of learning outcomes:		-			
Nr	Learning outcomes description	Method of assessment	Teach	ning methods	Learning outcomes reference coc	de
1	The student has an established and extended knowledge of the specialty	written test	lecture		K_W02	
2	The student has extended knowledge of chemistry of macromolecular compounds, including their practical application	written test	lecture		K_W03 ++	
3	The student can possess information from the literature, patent resources and databases and other properly selected scientific resources, in Polish and in a foreign language, can interpret the results and draw conclusions	report	laboratory		K_U01 ++ K_U04 ++	
4	The student has the ability to prepare oral presentations Or written reports on issues within the subject	oral presentation	laboratory		K_U06 ++ K_U04 ++	
5	The student understands the need of a lifelong	oral presentation	laboratory		K_K01	
18. T	eaching modes and hours					
Lect	ure -15 h, Laboratory -30 h					
19. \$	Syllabus description:					
L	ecture					
	1. Introduction to advanced ceramics.					
	2. Properties and classification of technical ceramic	S.				

- 3. Theoretical background in advanced ceramics.
- 4. Ceramic materials with specific electrical, optical and magnetic properties.
- 5. Biocompatible ceramics. Ceramics for special application
- 6. Classification of composite materials.
- 7. Polymer matrices in composite materials.
- 8. Advanced fiber reinforced composites: reinforcement types, composite properties and applications.
- 9. Nanocomposites: nanofiller types, nanocomposite properties and applications.
- 10. Methods of composite manufacturing.

## Laboratory

Manufacturing and characterization of fiber reinforced composites, nanocomposites and ceramics, which are an extension of the lectures.

20. Examination: no

## 21. Primary sources:

- 1. M. White , Properties of materials , Oxford University Press, New York & Oxford (1999).
- 2. R. Cotterill, The Cambridge guide to the Materials World, Cambridge University Press (1985)
- 3. L. Hench, J. Wilson An introduction to bioceramics, World Scientific, N.Y.(1993)
- 4. C.N.R.Rao, Chemistry of Advanced Materials, Blackwell Sci. Publ. (1993)

5. S R Suprakas, M Bousmina, Polymer Nanocomposites and Their Applications, Department of Chemical Engineering, Laval University, Canada 2006

6. R Krishnamoorti, R. Vaia, Polymer Nanocomposites Synthesis, Characterization, and Modeling Oxford University Press, 2001

## 22. Secondary sources:

- 1. L. Vlack, Materials Science for Engineers, Addison-Wesley Publishing Company, Massachusetts-Menlo Park, Ontario, (1975)
- 2. C.N.R.Rao and J. Gopalakhrishnan, New Directions in Solid State Chemistry , Cambridge University Press (1997)

1 Lecture 15/15   2 Classes /   3 Laboratory 30/30   4 Project /   5 BA/ MA Seminar /   6 Other /   7 Total number of hours 45/45   24. Total hours: 90 25. Number of ECTS credits: 3 26. Number of ECTS credits allocated for contact hours: 2	1 Lecture	4 = 14 =
2 Classes /   3 Laboratory 30/30   4 Project /   5 BA/ MA Seminar /   6 Other /   7 Total number of hours 45/45   24. Total hours: 90 25. Number of ECTS credits: 3 26. Number of ECTS credits allocated for contact hours: 2		15/15
3 Laboratory 30/30   4 Project /   5 BA/ MA Seminar /   6 Other /   7 Total number of hours 45/45   24. Total hours: 90 25. Number of ECTS credits: 3   26. Number of ECTS credits allocated for contact hours: 2	2 Classes	
4 Project /   5 BA/ MA Seminar /   6 Other /   7 Total number of hours /   24. Total number of hours: 90 45/45   25. Number of ECTS credits: 3 26. Number of ECTS credits allocated for contact hours: 2	3 Laboratory	30/30
5 BA/ MA Seminar /   6 Other /   7 Total number of hours 45/45   24. Total hours: 90 25. Number of ECTS credits: 3   26. Number of ECTS credits allocated for contact hours: 2	4 Project	
6 Other /   Total number of hours 45/45   24. Total hours: 90 45/45   25. Number of ECTS credits: 3 26. Number of ECTS credits allocated for contact hours: 2	5 BA/ MA Seminar	
Total number of hours 45/45   24. Total hours: 90 25. Number of ECTS credits: 3   26. Number of ECTS credits allocated for contact hours: 2	6 Other	1
24. Total hours: 90 25. Number of ECTS credits: 3 26. Number of ECTS credits allocated for contact hours: 2	Total number of hours	45/45
25. Number of ECTS credits: 3 26. Number of ECTS credits allocated for contact hours: 2	4. Total hours: 90	
26. Number of ECTS credits allocated for contact hours: 2	5. Number of ECTS credits: 3	
	6. Number of ECTS credits allocated for contact hours: 2	

Approved:

(date, Instructor's signature)

(date, the Director of the Faculty Unit signature)