Syllabus template

Course title: **Nanomaterials in environmental science**		
Programme:		Code: **0712**
Type of course: **Erasmus**	Course level:	Semester:
Form of classes: **lectures, project**	Number of hours: **15L, 15P**	Credit points: **5 ECTS**
Education profile:		Course language: **English**
Enrolment: yes/ ~~no~~		

GUIDE TO THE SUBJECT

I. COURSE CHART

COURSE OBJECTIVES

C.1. Knowledge of definition of nanomaterials and specific properties of nanomaterials.
C.2. Using of nanoparticles as cathalysts of process in environmental science (energy, water treatment, storage)
C.3. Methods of obtaining and materials used most often in nano technology.

PRELIMINARY COURSE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of chemistry and physics, heat engineering.
2. Ability to use professional literature

LEARNING OUTCOMES

EK 1- Student know the kind of nanomaterials and their environmental applications
EK 2 - Student know the definition of nanomaterials and specific properties of nanoscale materials

COURSE CONTENT

Form of classes - lectures	Hours
W1-W2 Definition of materials in nanoscale and specific properties	2
W3-W4 Production of nanomaterials, specific role of nanomaterials in environment, procedure of nanoparticles deposition	2
W5-W6 Structure of nanomaterials (nanowire, dendrimers, nanoparticles, etc.), nanoparticles alloys, kind of compounds of materials	2
W7-W8 Nanotechnology in agricultural applications.	2

W9-W10 Nanomaterials in hydrogen technology- fuel cells, nanomaterials as catalysts for electrochemical reactions, nanoparticles as energy carrier	2
W11-W12 Nanomaterials as biomaterials in medicine	2
W13-W14 Carbon based materials as nanomaterials (crop yield, nanoencapsulation, sorbents, plant protection, antimicrobial agents, etc.)	2
W15- Novelty in nanomaterials	1
Form of classes - project	**Hours**
P1-P4 Selection of the nanomaterial application area	4
P5- P9 Development of a procedure for the use of nanomaterials	4
P10 –P14. Description of the use of nanomaterials in a given area and elaboration of potential risks related to nanomaterials	4
P15. Presentation of the project	3

COURSE STUDY METHODS

1. blackboard, samples
2. multimedia presentation

METHODS OF ASSESMENT (F - formative; S - summative)

F1. – activity in classes
F2. – evaluation of task solving

STUDENT WORKLOAD

Form of activity	Workload (hours)
Participation in lectures	**15 h**
Participation in classes	**-**
Laboratory	**-**
Participation in project classes	**-**
Participation in seminar	**-**
Preparation course on e-learning	**-**
Test	**-**
Entrance test for laboratory classes	**-**
Project's defence	**15h**
Exam	**-**
Consultation hours	**2 h**
DIRECT TEACHING, hours/ ECTS	**32 h / 3 ECTS**
Preparation for tutorials	**-**
Preparation for laboratories	**-**
Preparation for projects	**4 h**
Preparation for seminars	**-**
Preparation for e-learning classes	**-**
Participation in e-learning classes	**-**
Working on project	**4 h**
Preparation for tests	**-**
Preparation for exam	**-**

SELF-STUDY, hours/ ECTS	**8 h / 2 ECTS**
TOTAL (hours)	**∑ 40 h**
TOTAL ECTS	**5 ECTS**

PRIMARY AND SUPPLEMENTARY TEXTBOOKS

1. Małgorzata Lewandowska, Ktrzysztof Kurzydłowski, Nanomateriały inżynierskie, PWN, Warszawa 2011
2. Ashby M., Sherclif H., Cebon D.: Inżynieria materiałowa. Tom 1, 2. Wyd. Galaktyka, Łódź, 2011
3. Przybyłowicz K., Metaloznawstwo, WNT, Warszawa 1992.
4. Staub F., Metaloznawstwo, Wydawnictwo „Śląsk", Katowice 1979.
5. Dobrzański L.: Podstawy nauki o materiałach i metaloznawstwo. WNT, Warszawa, 2002

SUBJECT COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

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NAME OF LECTURER (s) (NAME, SURNAME, E-MAIL ADDRESS)

1. dr inż. Renata Włodarczyk, rwlodarczyk@is.pcz.czest.pl

Learning outcome	In relation to the learning outcomes specified for the field of study	Course objectives	Course content	Course study methods	Methods of assesment
EK 1		W1-W15	C1-C3	1, 2	F1, F2
EK 2		W1-W15	C1-C3	1, 2	F1, F2
EK 3		P1-P15	C1-C3	1, 2	F1, F2

II. OTHER USEFUL INFORMATION

1. All the information on the class schedule is posted on the student information board and online at: www.is.pcz.pl
2. The information about the consultation hours is provided to students on the first class meeting and posted online at rwlodarczyk@is.pcz.czest.pl
3. The information on course completion and grade is provided to students on the first class meeting.