Course title: **Nanomaterials in environmental science** Nanomateriały w naukach o środowisku		
Field of study:		
Type of study: **full-time studies**	The level of education: **first-cycle studies**	Education profile: **general academic**
Type of subject: Wybierz element.	Semester: Wybierz element.	Course language: **English**
Course type: **lecture, tutorial**	Number of hours: **15L, 15T**	ECTS Credit points: **5**

SYLLABUS

COURSE CONTENT

Form of classes - lectures	**Hours**
Definition of materials in nanoscale and specific properties	2
Production of nanomaterials, specific role of nanomaterials in environment, procedure of nanoparticles deposition	2
Structure of nanomaterials (nanowire, dendrimers, nanoparticles, etc.), nanoparticles alloys, kind of compounds of materials	2
Nanotechnology in agricultural applications	2
Nanomaterials in hydrogen technology- fuel cells, nanomaterials as catalysts for electrochemical reactions, nanoparticles as energy carrier	2
Nanomaterials as biomaterials in medicine	2
Carbon based materials as nanomaterials (crop yield, nanoencapsulation, sorbents, plant protection, antimicrobial agents, etc.)	2
Novelty in nanomaterials. Test.	1
Form of classes - tutorials	**Hours**
Selection of the nanomaterial application area	4
Development of a procedure for the use of nanomaterials	4
Description of the use of nanomaterials in a given area and elaboration of potential risks related to nanomaterials	4
Physical analysis of carbon nanomaterials	2
Test	1

COURSE STUDY METHODS

1. blackboard
2. multimedia presentation

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

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

S1. – test
S2.- seminary/presentation

STUDENT WORKLOAD

Form of activity	Workload (hours)
Participation in lectures	15 h
Participation in classes	-
Laboratory	-
Participation in project classes	-
Participation in seminar	15h
Preparation course on e-learning	-
Test	5 h
Entrance test for laboratory classes	-
Project's defence	-
Exam	-
Consultation hours	2 h
DIRECT TEACHING, hours/ ECTS	**37 h / 3 ECTS**
Preparation for tutorials	15 h
Preparation for laboratories	-
Preparation for projects	-
Preparation for seminars	5 h
Preparation for e-learning classes	-
Participation in e-learning classes	-
Working on project	-
Preparation for tests	-
Preparation for exam	-
SELF-STUDY, hours/ ECTS	**20 h / 2 ECTS**
TOTAL (hours)	**∑ 57**
TOTAL ECTS	**5 ECTS**

PRIMARY AND SUPPLEMENTARY TEXTBOOKS

Małgorzata Lewandowska, Ktrzysztof Kurzydłowski, Nanomateriały inżynierskie, PWN, Warszawa 2011
Ashby M., Sherclif H., Cebon D.: Inżynieria materiałowa. Tom 1, 2. Wyd. Galaktyka, Łódź, 2011
Przybyłowicz K., Metaloznawstwo, WNT, Warszawa 1992.

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