

FACULTY OF CHEMISTRY					
SUBJECT CARD					
Name of subject in Polish:	Zielona chemia i zrównoważone technologie				
Name of subject in English:	Green Chemistry and Sustainable Technology				
Main field of study (if applicable):	Chemical Engineering and Technology				
Specialization (if applicable):	Advanced Chemical Technology				
Profile:	academic				
Level and form of studies:	2nd level, full-time				
Kind of subject:	obligatory				
Subject code:	W03CET-SM2010W, W03CET-SM2010P				
Group of courses:	NO				
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15			30	
Number of hours of total student workload (CNPS)	25			75	
Form of crediting (Examination / crediting with grade)	exam			crediting with grade	
For group of courses mark (X) final course					
Number of ECTS points	2			3	
including number of ECTS points for practical classes (P)				3	
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	0,6			1,2	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1.

SUBJECT OBJECTIVES

C1 students' understanding of advanced issues in the field of green chemistry and chemical technologies in relation to sustainable development goals

C2 deepening students' skills in group work and strengthening their need for constant improvement

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

a student completing a course

PEU_W01 has in-depth knowledge of the principles of green chemistry

PEU_W02 has advanced knowledge of the sustainable development of the chemical industry, as well as techniques, processes and technologies supporting the achievement of sustainable development goals

relating to skills:
 a student completing a course
 PEU_U01 is able to work using a case study
 PEU_U02 is able to plan activities, work in a group, collect and analyze data, develop a project in the form of a compact document,
 PEU_U03 is able to organize a discussion, present the results of one's work, and defend the presented theses

relating to social competences:
 a student completing a course
 PEU_K01 is aware of the importance of knowledge in a context beyond technical and engineering aspects
 PEU_K02 is ready to use the experience and knowledge of specialists
 PEU_K03 is aware of the role of an engineer in the modern world, including the need to inform society about the most important aspects of sustainable development

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Green Chemistry – principles, concepts	2
Lec 2	Green Chemistry – green catalysis, green solvents, green processing	2
Lec 3	Green Chemistry – safety, waste management	2
Lec 4	Introduction to sustainable development (SD) – concepts, principles, definitions, models	2
Lec 5	A role of sustainability in biotechnology and chemical industry – the pollution prevention in chemical industry, the design and modeling of the sustainable manufacturing and industrial processes, conservation and management of resources	2
Lec 6	Sustainable development in chemistry and chemical technology – case studies	2
Lec 7	Environmental sustainability, Zero emission concept, Cleaner Production concept	2
Lec 8	The challenges for green chemistry and sustainable chemical technologies	1
Total hours		15
Project		Number of hours
Pr1	Learning with the project method – introduction. Selection and discussion of group and individual project topics.	2
Pr2-Pr7	Working on a project. Collecting data, discussing assumptions for team and individual projects. Consultations. Brainstorm.	12
Pr8	Presentations of assumptions for team and individual projects – discussion.	2
Pr9-Pr14	Working on a project. Development of team and individual projects. Preparation of final reports	12
Pr5	Presentations of team and individual projects – summary discussion.	2

Total hours	30
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TEACHING TOOLS USED

N1. Multimedia presentation
N2. Discussion
N3. Consultations

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
P=0,1xF1+0,9xF2	PEU_W01-PEU_W02 PEU_K01, PEU_K03	F1-Engagement rating in discussions (10%); F2-Exam (90%)
P=0,4xF1+0,3xF2+0,3xF3	PEU_U01-PEU_U03 PEU_K01-PEU_K03	Assessment of: F1-quality of presentation, involvement in group work, participation in discussions (40%); F2-Group project evaluation (30%); F3-Assessment of the individual project (30%)

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Vincenzo Piemonte, Marcello De Falco, Angelo Basile, Sustainable Development in Chemical Engineering: Innovative Technologies, Wiley 2013, ISBN: 978-1-119-95352-4
[2] Sustainable Industrial Processes, ed. By F. Cavani, G. Centi, S. Perathoner and F. Trifiro, Wiley-VCH 2009

SECONDARY LITERATURE:

- [1] Current scientific publications
[2] Current UN, EU, USEPA reports on the SDGs

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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