

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Engineering of Environmental Protection Processes		Code 1010702121010722581
Field of study Chemical and Process Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Chemical Engineering	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art		ECTS distribution (number and %)
Responsible for subject / lecturer: Prof. dr hab. Lubomira Broniarz-Press email: lubomira.broniarz-press@put.poznan.pl tel. 61 6652789 Wydział Technologii Chemicznej ul. Piotrowo 3 60-965 Poznań		Responsible for subject / lecturer: dr inż. Marek Ochowiak email: marek.ochowiak@put.poznan.pl tel. 61 6652147 Wydział Technologii Chemicznej ul. Piotrowo 3 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	? Basics of chemical and process engineering, ? basics of kinetics of heat and mass transfer, ? basics of environmental engineering. ? basics of automation and industrial measurements, ? Basic knowledge in the design and operation of process equipment,
2	Skills	? design basic apparatus used in chemical engineering and environmental engineering, ? analysis of the literature in the field of chemical and process engineering, ? mathematical calculations.
3	Social competencies	? the student knows of the advantages and limitations of individual and group work in solving the problems of an industrial, ? the student knows the limits of his own knowledge and understands the need for continuing education.
Assumptions and objectives of the course: The aim is obtaining knowledge of process engineering environmental. The calculation and application of selected processes in environmental protection and designing od apparatus are discussed. Particular attention is directed to a device for water and wastewater treatment are important from the point of view of environmental engineering.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He has the knowledge needed to formulate and solve computing tasks cameras for selected environmental processes. - [K_W01; K_W02; K_W03]		
2. He has knowledge of complex chemical processes involving the selection of materials, apparatus and equipment for chemical processes in environmental protection. - [K_W04]		
3. He knows the environmental issues related to the implementation of industrial chemical processes. - [K_W09]		
Skills:		
1. He can use of sources of knowledge and gain knowledge from the literature sources. - [K_U01]		
2. He is able to independently determine the directions of further education and find a topic to study. - [K_U05]		
3. He can verify the modern concepts of engineering solutions in relation to the existing state of knowledge. - [K_U10]		
Social competencies:		
1. He has shaped awareness of the limitations of science and technology related to the protection of the environment. - [K_K02]		

Assessment methods of study outcomes		
Knowledge Test - 1,2,3		
Skills Test - 1,2,3		
Social competences Test - 1		
Course description		
<p>During the course are discussed:</p> <p>? Methods to prevent of the pollution of air, water and soil, both through actions to minimize the generation of pollutants and their removal.</p> <p>? Analysis and design cleaning processes of gases, liquids and emulsions, industrial wastewater and sewage, absorption and spraying and apparatus.</p> <p>? processes and apparatus in the industry.</p> <p>? mechanical purification, physical, chemical, electrical, etc., and environmental protection standards.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> Ochowiak M., Broniarz-Press L.: Inżynieria procesów ochrony środowiska, Wyd. Politechniki Poznańskiej, Poznań, 2012. Bandrowski J., Merta H., Ziolo J.: Sedymentacja zawiesin. Zasady i projektowanie, Wyd. Politechniki Śląskiej, Gliwice, 1995. Bandrowski J., Troniewski L.: Destylacja i rektyfikacja, Wyd. Politechniki Śląskiej, Gliwice, 1987. Biń A. i inni: Zadania projektowe z inżynierii chemicznej, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2002. Gawroński R.: Procesy oczyszczania cieczy, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 1999. Zarzycki R.: Wymiana ciepła i ruch masy w inżynierii środowiska, WNT, Warszawa, 2005. Orzechowski Z., Prywer J.: Wytwarzanie i zastosowanie rozpylonej cieczy, Wydawnictwa Naukowo-Techniczne, Warszawa 2008. 		
Additional bibliography:		
<ol style="list-style-type: none"> Piekarski M., Poniewski M.: Dynamika i sterowanie procesami wymiany ciepła i masy, WNT, Warszawa 1994. Selecki A., Gawroński R.: Podstawy projektowania wybranych procesów rozdzielania mieszanin, WNT, Warszawa, 1992. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Participation in consultation	5	
3. Preparation for the test	15	
Student's workload		
Source of workload	hours	ECTS
Total workload	50	2
Contact hours	35	2
Practical activities	0	0