

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Purification Processes		Code 1010702111010722574
Field of study Chemical and Process Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 1
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: - Classes: - Laboratory: 3 Project/seminars: -		No. of credits 3
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	? basic knowledge on the kinetics of heat and mass transfer, ? basic knowledge in the design and operation of process equipment, ? basis of mathematical analysis ? basis of the process control
2	Skills	? statistical analysis of the measurement results, ? mathematical calculations
3	Social competencies	? Student knows 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 of the course is to acquaint the student with a practical course of diffusion-thermal and mechanical processes for the purification of gases, liquids and solids in the chemical industry and environmental protection. Subject is directed to expand practical skills.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. He has an extended knowledge of the diffusion-thermal and mechanical processes of purification of gases, liquids and solids, important from the point of view of chemical engineering and environmental - [K_W04, K_W09]		
Skills: 1. He can project the process of separating mixtures and carry it on the basis of the theoretical calculations - [K_U09; K_U19] 2. He can set process conditions in order to set the efficiency of separation of mixtures - [K_U19] 3. Based on analysis of the type and concentration of the dust he is able to choose the apparatus for purifications a gas / liquid systems - [K_U18] 4. He can use the computer image analysis to determine the shape and size of the solid particles. - [K_U07] 5. He has the ability to group work and is aware of the safety rules - [K_U15] 6. Has is able to present research data in a report form. - [K_U06] 7. He is able to critically assess the results of experimental studies. - [K_U18]		
Social competencies: 1. He has a sense of responsibility for group work and responsibility for it. - [K_K05] 2. He knows the limitations of science and technology related to the protection of the environment. - [K_K02]		

Assessment methods of study outcomes	
<p>Knowledge Points 1: Test in the form of problem questions</p> <p>Skills: Points 1-3: Test in the form of problem questions, Points 4-7: Response establishing and assessment report conducted laboratory exercises</p> <p>Social competences Point 1: The activity in the classroom and assessment of involvement in the execution of individual tasks by group Point 2: Interview with the group about the limitations of technology in environmental protection</p>	
Course description	
<p>The laboratory includes the following processes:</p> <ul style="list-style-type: none"> - simple bath distillation, - bath destilation under conditions of constant reflux, - Mass transfer in the process of aerating a liquid, - sieve analysis, - purification in the dust collector chamber, - purification in a filter, - foam separation, - ion exchange, - separation of petroleum products - computer image analysis of dust particles. 	
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. L. Broniarz-Press, P. Agaciński, M. Ochowiak, J. Różański.: Procesy oczyszczania, Wydawnictwo Politechniki Poznańskiej, Poznań, 2011. 2. Bandrowski J., Merta H., Ziolo J.: Sedymentacja zawiesin. Zasady i projektowanie, Wydawnictwo Politechniki Śląskiej, Gliwice, 2001. 3. Bandrowski J., Troniewski L.: Destylacja i rektyfikacja, Wydawnictwo Politechniki Śląskiej, Gliwice, 1996. 4. Gawroński R.: Procesy oczyszczania cieczy, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 1999 5. Koch R., Koziol A.: Dyfuzyjno-ciepłny rozdział substancji, WNT, Warszawa, 1994. 6. Koch R., Noworyta A.: Procesy mechaniczne w inżynierii chemicznej, WNT, Warszawa, 1998. 7. Warych J.: Oczyszczanie gazów. Procesy i aparatura, WNT, Warszawa, 1998. 8. Warych J.: Procesy oczyszczania gazów. Problemy projektowo-obliczeniowe, Oficyna Wydawnicza Politechniki Poznańskiej, Warszawa, 2000. 9. Zarzycki R.: Wymiana ciepła i ruch masy w inżynierii środowiska, WNT, Warszawa, 2005. 	
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Broniarz-Press L. i inni: Inżynieria Chemiczna i Procesowa. Materiały Pomocnicze. I. Reologia techniczna i procesy przenoszenia pędu, Wydawnictwo Politechniki Poznańskiej, Poznań, 1999 2. Broniarz-Press L. i inni: Inżynieria Chemiczna i Procesowa. Materiały Pomocnicze. II. Procesy wymiany ciepła, Wydawnictwo Politechniki Poznańskiej, Poznań, 2001 3. Broniarz-Press L. i inni: Inżynieria chemiczna i procesowa. Materiały pomocnicze. III. Procesy wymiany masy, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005 4. Selecki A., Gawroński R.: Podstawy projektowania wybranych procesów rozdzielania mieszanin, WNT, Warszawa, 1992 5. Hobler T.: Dyfuzyjny ruch masy i absorbery, WNT, Warszawa, 1976. 6. Hobler T.: Ruch ciepła i wymienniki, WNT, Warszawa, 1986. 	
Result of average student's workload	
Activity	Time (working hours)
1. Preparation for laboratory classes	11
2. Preparation of the report of the resulting experience	12
3. Preparation for the test	5
4. Execution of laboratory exercises	45
5. Test	2

Student's workload		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	50	2
Practical activities	45	2