

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Monitoring Methods of Technological Processes		Code 1010702321010720022
Field of study Technologie ochrony środowiska - stacjonarne	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Ecotechnology	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: 1 Classes: 1 Laboratory: 1 Project/seminars: -		No. of credits 5
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. inż. Adam Voelkel email: Adam.Voelkel@put.poznan.pl tel. (61) 665 3687 Wydział Technologii Chemicznej ul. Piotrowo 3 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic physical, inorganic, organic and analytical chemistry on academic level; knowledge of mathematical tools used in chemical calculations
2	Skills	Can use basic laboratory techniques of separation and cleaning of chemical compounds
3	Social competencies	Understands the need to supplement her/his education and increasing personal and professional competences
Assumptions and objectives of the course: Presentation of the fundamentals of chromatographic processes; their application in qualitative and quantitative analysis as well as physicochemical characterization of organic and inorganic substances. The chromatographic equipment is discussed. Process chromatography		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. knowledge in the field of techniques, methods connected with the application of chromatographic techniques in process control - [K_W03, K_W09, K_W11]		
2. can describe methods, techniques, tools and materials used for the solution of simple problems connected with process control - [K_W07, K_W15]		
Skills:		
1. Student can select the proper technique for process control - [K_U01, K_U08, K_U09, K_U14]		
2. Student has basic skills for maintenance of gas or liquid chromatograph and to perform the chromatographic analyses - [K_U09]		
3. Student can discuss chromatographic problems in English - [K_U05]		
Social competencies:		
1. Student understands the need to supplement her/his education and increasing professional competences - [K_K01]		
2. Student has the awareness to obey the engineer ethic rules - [K_K02, K_K05]		
3. Student can act and cooperate in the group accepting different roles - [K_K03]		
Assessment methods of study outcomes		

written control work. Permanent control before laboratory classes. Written reports from exercises. Short project concerning the selection and design of process control system.		
Course description		
<ol style="list-style-type: none"> 1. Gas chromatography technique ? equipment, basis theoretical rule of chromatographic separation ; Basic chromatographic parameters; selection of the conditions of chromatographic analysis. 2. High performance liquid chromatography ? various types of liquid chromatography; backgrounds of separation; columns in HPLC; HPLC and TLC equipment. 3. Qualitative and quantitative analysis in chromatography. 4. Process analysis ? general rules of application of process analyzers. 5. Economical aspects of process control. 6. GC i HPLC systems used in chromatographic process analysis. 7. Examples of the applications of chromatographic process analysis in the process control of technological systems.. 		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Podstawy chromatografii, Z.Witkiewicz, WNT, Warszawa, 2005 2. Zastosowanie metod chromatograficznych, K. Bielicka-Daszkiewicz, K. Milczewska, A. Voelkel, Wyd. PP, Poznań, 2005, 2010. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. The essence of chromatography, C.F. Poole, Elsevier, Amsterdam, 2003. 2. Techniques and practice of chromatography, R.P.W.Scott, Marcel Dekker, Inc., Nowy Jork, 1995. 3. Chromatografia gazowa w badaniach adsorpcji i katalizy, T. Paryjczak, PWN, Warszawa, 1986. 4. Adsorpcja i adsorbenty: teoria i zastosowanie, Z. Sarbak, Wydaw. Naukowe Uniwersytetu im. Adama Mickiewicza, 		
Result of average student's workload		
Activity	Time (working hours)	
1. lecture	15	
2. lecture consultations	5	
3. project	15	
4. project consultations	5	
5. lab consultations	5	
6. lab preparations	5	
7. . laboratory classes	15	
8. credit preparation	20	
9. credit	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	85	5
Contact hours	60	3
Practical activities	40	2