

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Environmental Monitoring		Code
Field of study Environmental Protection Technologies	Profile of study (general academic, practical) general academic	Year /Semester 3/6
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) compulsory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: - Laboratory: - Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) (university-wide, from another field)		
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 2 - 100%
Responsible for subject / lecturer: dr. hab. inż. Agnieszka Zgoła-Grzeszkowiak e-mail: agnieszka.zgola-grzeszkowiak@put.poznan.pl tel. 616652033 Wydział Technologii Chemicznej ul. Berdychowo 4 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge:	The student has ordered knowledge in the field of analytical chemistry, basic knowledge about the properties of chemical compounds. Has basic knowledge in the field of ecology and nature protection.
2	Skills:	The student has the ability to obtain the necessary information from literature and databases.
3	Social competencies:	The student understands the need to learn and improve his/her professional and personal competences.
Assumptions and objectives of the course: Transfer of knowledge about the theoretical foundations of environmental monitoring, diagnosing and forecasting the course of environmental phenomena and processes and knowledge in the field of the systems' bases: monitoring, collecting, transmitting and processing data on the state of the environment.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
<ol style="list-style-type: none"> 1. K_W05 The graduate knows the principles of environmental protection related to chemical production and waste management. The student knows the basic concepts related to environmental monitoring and its development, can explain the principles of SEM. 2. K_W07 The graduate has a theoretical background and general knowledge of inorganic, organic, physical and analytical chemistry and knowledge of methods, technical and technological capabilities of monitoring the components of the environment. 3. K_W14 The graduate has a general knowledge necessary to understand the social, economic, legal and other non-technical conditions of the engineering activity. The graduate knows the scope, structure and organization of environmental monitoring in Poland. 		

Skills:
<ol style="list-style-type: none"> 1. K_U06 The graduate has the ability to self-study. The graduate searches and analyzes relevant legal acts regarding monitoring matters. 2. K_U08 The graduate uses correct terminology and nomenclature in the field of environmental protection technologies , also in English. 3. K_U10 The graduate includes legal regulations in the area of product standards and testing standards. 4. K_U18 The graduate can estimate the suitability and select the tools and methods to solve the problem in the field of environmental protection technologies.
Social competencies:
<ol style="list-style-type: none"> 1. K_K02 The graduate is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its environmental impact and the resulting responsibility for his/her decisions. The graduate understands the need to monitor the environment, inform the public and decision-makers about environmental pollution in order to react to restore its good condition.
Assessment methods of study outcomes
Assessment colloquium, activity at lectures.
Course description
<p>Basic concepts in the field of environmental monitoring. Outline of the State Environmental Monitoring in Poland: objectives, organizational structure and legal bases of the SEM. Environmental management system. Information on sources and loads of substances discharged into the environment.</p> <p>Atmospheric air monitoring, scope and scale of tests, acceptable air quality standards.</p> <p>Surface and underground water monitoring, scope and scale of research, acceptable water quality standards, information for the needs of water management.</p> <p>Soil monitoring. Sources of pollution, pollution indicators, soil pollution assessment criteria.</p> <p>Noise monitoring. Permissible levels. Noise emissions from industrial facilities and municipal utilities. Ways of noise protection. Monitoring of electromagnetic fields</p> <p>Biomonitoring, biological methods used in environmental monitoring. Monitoring of forests, plants and animal organisms.</p> <p>Environmental monitoring - principles and methods of sampling and their analysis. Monitoring methods, measurement and alarm systems. Remote monitoring of the quality of the environment.</p>
Basic bibliography:
<ol style="list-style-type: none"> 1. Program Państwowego Monitoringu Środowiska na lata 2016-2020, Biblioteka Monitoringu Środowiska, Warszawa 2015 2. Publications from the series Biblioteka Monitoringu Środowiska. Wyd. GIOŚ 3. Reports on the state of the environment in the province Wielkopolska, WIOŚ Poznań 4. Report Stan Środowiska w Polsce. Sygnały 2016, Biblioteka Monitoringu Środowiska, Warszawa 2017. 5. W. Chełmicki; Woda, Zasoby, degradacja, ochrona. PWN Warszawa 2000
Additional bibliography:
<ol style="list-style-type: none"> 1. Web page of the European Environment Agency https://www.eea.europa.eu/pl 2. Web page of the Main Inspectorate of Environmental Protection http://www.gios.gov.pl/pl/ 3. Web page of the Provincial Inspectorate for Environmental Protection in Poznań http://poznan.wios.gov.pl/

Result of average student's workload		
Activity	Time (working hours)	
1. lecture	30	
2. consultation for the lecture	8	
3. preparation for the colloquium	10	
4. colloquium	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	50	2
Contact hours	40	0
Practical activities	4	0