

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Measurements and Control in Chemical Technology</b>		Code <b>1010704281010720646</b>
Field of study <b>Chemical Technology</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>4 / 8</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>10</b> Classes: <b>-</b> Laboratory: <b>-</b> Project/seminars: <b>10</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art		ECTS distribution (number and %)
<b>Responsible for subject / lecturer:</b> dr inż. Marek Ochowiak email: marek.ochowiak@put.poznan.pl tel. 61 6652147 Wydział Technologii Chemicznej ul. Piotrowo 3 60-965 Poznań		<b>Responsible for subject / lecturer:</b> 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
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	? Basic chemical and process engineering, ? basics of electronics and electrical engineering, ? Basic knowledge in the design and operation of process equipment.
2	<b>Skills</b>	? analysis of the measurement data obtained in the field of chemical and process engineering, ? mathematical calculations.
3	<b>Social competencies</b>	The student knows the advantages and limitations of individual and group work in solving the industrial problems, The student knows the limits of his own knowledge and understands the need for continuing education.
<b>Assumptions and objectives of the course:</b> Obtaining knowledge of measurement technology, measurement and control equipment in the chemical industry and the elements of industrial automation and process control.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. He knows the basics of measurement and control systems and control systems. - [K_W06] 2. He has knowledge of the control of technological processes in chemical technology - [K_W06] 3. He has knowledge of basic measurements in chemical technology. - [K_W06] 4. He has expertise in automation and measurement in chemical technology to solve simple tasks. - [K_W05]		
<b>Skills:</b>		
1. He can use the sources of knowledge (basic bibliography) and gain knowledge from other literature sources. - [K_U01] 2. He is able to work both individually and in professional teams. - [K_U02] 3. He is able to prepare and present an oral presentation in the field of automation and measurement in chemical technology. - [K_U04] 4. He can use the knowledge to design and optimization of automatic control systems and measurement systems. - [K_U08]		
<b>Social competencies:</b>		
1. He understands the need for further education and improve their professional skills, looking for additional literature to oral presentation and exercises. - [K_K01] 2. He is able to work in a group. - [K_K03]		

<b>Assessment methods of study outcomes</b>	
<p>Knowledge                      The exam written / oral - 1,2,3                      Exercise Design - 4                      Oral presentation - 4</p> <p>Skills                      The exam written / oral - 1                      Exercise Design - 2.4                      Oral presentation - 2.3</p> <p>Social competences                      The exam written / oral - 1                      Exercise Design - 2                      Oral presentation - 2</p>	
<b>Course description</b>	
<p>During the course are discussed:</p> <ul style="list-style-type: none"> <li>? Basic issues.</li> <li>? Systems of automatic control.</li> <li>? The adjustment and executive elements.</li> <li>? Systems of pneumatic, hydraulic and electric.</li> <li>? feedback, control and regulation systems.</li> <li>? Regulators.</li> <li>? Stability and quality control.</li> <li>? Signaling, lock and security.</li> <li>? Sensors.</li> <li>? Measurement, measuring instruments and transducers.</li> <li>? Control values ??and technological processes in the chemical and process engineering.</li> </ul>	
<p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Piekarski M., Poniewski M.: Dynamika i sterowanie procesami wymiany ciepła i masy, WNT, Warszawa 1994.</li> <li>2. Senczyna S.: Modelowanie sterowania procesów przemysłowych, Wyd. Politechniki Śląskiej, Gliwice 1997.</li> <li>3. Blachuta M.: Laboratorium teorii sterowania i podstaw automatyki, Wyd. Politechniki Śląskiej, Gliwice 1999.</li> <li>4. Gessing R.: Podstawy automatyki, Wyd. Politechniki Śląskiej, Gliwice 2001.</li> <li>5. Mikulski J.: Podstawy automatyki ? liniowe układy regulacji, Wyd. Politechniki Śląskiej, Gliwice 2001.</li> <li>6. Urbaniak A.: Podstawy automatyki, Wyd. Politechniki Poznańskiej 2001.</li> <li>7. Kuźnik J.: Regulatory i układy regulacji, Wyd. Politechniki Śląskiej, Gliwice 2003.</li> <li>8. Kostro J.: Elementy, urządzenia i układy automatyki, Wydawnictwa Szkolne i Pedagogiczne, Warszawa 2006.</li> </ol>	
<p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Pasko M., Walczak J.: Teoria sygnałów, Wyd. Politechniki Śląskiej, Gliwice 2003.</li> <li>2. Kacperski W., Kruszewski J., Marcinkowski R.: Inżynieria systemów procesowych. Elementy syntezy procesów technologicznych, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2002.</li> <li>3. Trybus L.: Regulatory wielofunkcyjne, WNT, Warszawa 1995.</li> <li>4. Metzger R.: Mikroprocesorowe urządzenia i układy automatyki, Wyd. Politechniki Śląskiej, Gliwice 2000.</li> </ol>	
<b>Result of average student's workload</b>	
Activity	Time (working hours)
1. Participation in lectures	10
2. Participation in consultation	3
3. Exam Preparation	5
4. The presence of the exam	2
5. Preparation for design classes	5
6. Participation in the project activities	10
<b>Student's workload</b>	

<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	35	3
Contact hours	25	3
Practical activities	10	1