

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Economical Analysis of Industrial Processes		Code 1010702121010722572
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: 1 Classes: - Laboratory: - Project/seminars: 1		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 technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Jacek Różański email: jacek.rozanski@put.poznan.pl tel. 61 665 2147 Faculty of Chemical Technology ul. Piotrowo 3, 60-965 Poznań		Responsible for subject / lecturer: dr inż. Piotr Tomasz Mitkowski email: piotr.mitkowski@put.poznan.pl tel. 61 665 2789 Faculty of Chemical Technology ul. Piotrowo 3, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Student knows: - basic mathematics, - design principles of unit operations, - basic knowledge of chemical apparatus.
2	Skills	Student has ability of: - reading and understanding of simple process flow diagrams (PFD) and piping and instrumentation diagrams (P&ID), - principles of transport phenomena (mass, heat and momentum), - description of chemical reaction heat effects, - performing calculation with spreadsheet.
3	Social competencies	The student understands the need to broaden their knowledge and skills due to the rapid advances in the chemical industry. He is aware that continuous training is a way to remain competitive in the labor market.
Assumptions and objectives of the course: The course aims to provide a basic knowledge on assessment of the effectiveness of investments in the chemical and other processing industries taking into account the legal and environmental aspects.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Knows basic definitions form field of financial accounting. - [K_W10] 2. Knows methods of economical assessments of investment projects with assessments of ecological impact. - [K_W10, K_W09] 3. Knows assessments methods of investment capitals, e.g. fixed capital, working capital; production costs, incomes and profits in chemical industry and other process industries. - [K_W10]		
Skills:		

<p>1. Student has ability to understand and use terminology from field of financial accounting. - [K_U04]</p> <p>2. Student is able to determine economic efficiency of the investment with use of the static and dynamic methods. - [K_U16, K_U20]</p> <p>3. Student is able to assess investment capital using historical cost based methods. - [K_U16, K_U01, K_U17]</p> <p>4. Student is able to assess: working capital, variable and fixed production costs and profit for manufacturing processes in the chemical industry. - [K_U09, K_U11 K_U16]</p>
<p>Social competencies:</p> <p>1. Student is aware of the advantages and limitations of individual work and teamwork in solving industrial and interdisciplinary problems. Student is aware of the responsibility for collaborative tasks in the teamwork. - [K_K05]</p> <p>2. Student knows the limitations of his own knowledge and understands the need for lifelong learning and professional competence improvement. - [K_K01]</p> <p>3. Student can think and act in a creative and enterprising manner. - [K_K06]</p>

<p>Assessment methods of study outcomes</p>
<p>Knowledge Test. Applies to 1-3 points.</p> <p>Skills Activity in the classroom and preparation of project. Applies to 1-4 points.</p> <p>Social competences Presentation of the report in the form of a multimedia presentation, defence and discussion in front of whole project group. This refers to points 1-3.</p>
<p>Course description</p>
<p>During the course the following aspects will be presented:</p> <ol style="list-style-type: none"> 1. Basic concepts of financial accounting (revenues, costs, profit, tax, depreciation) 2. Economic evaluation of projects <ol style="list-style-type: none"> 2.2. Cash flows 2.3. Basic methods of economic evaluation (payback period (payback time), return on investment, break-even analysis) 2.4. Time value of money 2.5. Net Present Value 2.6. Internal Rate of Return 2.7. Annuities 2.8. Selection of projects with limited investment resources 2.9. Sensitivity analysis 2.10. Economic analysis of the environmental effect of investment 3. Estimating capital costs <ol style="list-style-type: none"> 3.2. Accuracy and Purpose of Capital Cost Estimates 3.3. Historic cost data 3.4. Step count method 3.5. The factorial method of cost estimation 3.6. Estimating offsite costs 3.7. Cost escalation (inflation) 3.8. Location of the investment 3.9. Validity of cost estimates 4. Estimating production costs <ol style="list-style-type: none"> 4.1. Working capital 4.2. Variable and fixed Costs of Production 4.3. Utility costs 4.4. Consumables costs 4.5. Waste disposal costs 4.6. Labor costs 5. Estimating Revenues and profits

Basic bibliography:		
1. Mitkowski P.T., Różański J., Analiza ekonomiczna procesów przemysłowych, Wydawnictwo Politechniki Poznańska, 2012.		
2. Rekowski M., Wprowadzenie do mikroekonomii, Wydawnictwo Akademi Ekonomicznej w Poznaniu, 2001.		
3. Chadwick L., Rachunkowość zarządcza dla niewtajemniczonych, Agencja Wydawnicza Placet, 1997.		
Additional bibliography:		
1. Gabrusewicz W., Kamela-Sowińska A., Poetschke H., Rachunkowość zarządcza, Wydawnictwo Akademi Ekonomicznej w Poznaniu, 2001.		
2. Rekowski M., Mikroekonomia, Wydawnictwo Akademi Ekonomicznej w Poznaniu, 2005.		
3. Solińska M., Soliński I., Efektywność ekonomiczna proekologicznych inwestycji rozwojowych w energetyce odnawialnej, Uczelniane Wydawnictwa naukowo-Dydaktyczne AGH, Kraków 2003.		
4. Perry R. H., Green D. W., Perry's chemical engineering handbook, seventh edition, McGraw-Hill, 1997.		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for the test	21	
2. Test	1	
3. Project preparation and presentation	28	
Student's workload		
Source of workload	hours	ECTS
Total workload	50	2
Contact hours	30	1
Practical activities	15	1