

Field of study		Chemical Engineering					
Mode of study		stationary	Level	first cycle			
Graduate's qualification		inżynier					
Area(s) of study		nauki techniczne					
Educational profile		general academic					
Module							
Course unit		Systems Engineering					
Code		ChEn_1A_S_C15					
Field of specialisation							
Administering faculty		Institute of Chemical Engineering and Environmental Protection Processes					
ECTS		5,0	ECTS (forms)	5,0			
Form of course credit		examination	Language	english			
Electives			Elective group				
Form of instruction		Code	Semester	Hours	ECTS	Weight	Credit
lecture		W	5	15	2,0	0,50	examination
laboratory course		L	5	45	3,0	0,50	credits
Leading teacher		Story Grzegorz (Grzegorz.Story@zut.edu.pl)					
Other teachers		Sobolewski Piotr (psobolewski@zut.edu.pl), Story Grzegorz (Grzegorz.Story@zut.edu.pl)					
Prerequisites							
W-1		Basic knowledge of mathematics.					
Module/course unit objectives							
C-1		Student will become familiar with the basics of processes system designing, including elements of the process design and design strategy. Student learns the principles of selecting processes and parameters of their work, design heuristics and simulation software.					
C-2		Preparing the student to elaboration of the process systems project. Student is able to assess the conditions that have to be met for the implementation of a project, involving the construction or modernization of the installation. Student possesses ability to design the process.					
Course content divided into various forms of instruction							Number of hours
T-W-1		Introduction to the Engineering Systems: subject and scope of process design, concepts of the process design, technological design and system. Connection between research, design and implementation of the system. Stakeholders and requirements of the system.					2
T-W-2		Elements of the process design: research and industrial assumptions, choice and description of the technological method, process diagram, mass and heat balance, selection of technological apparatus, technological scheme, apparatus work schedule, selection of materials and corrosion issues, measurements and processes automation, sewage and waste, safety issues.					9
T-W-3		Hierarchical and simultaneous strategies of the technological systems design with several examples.					2
T-W-4		Basic principles of processes selection and setting of operating parameters. Design heuristics.					2
T-L-1		Calculations leading to the development of a comprehensive project of a selected industrial installation in the field of chemical engineering. During design a number of issues will be taking into account, i.e. safety, functionality, innovative solutions, iso-performance, economic and environmental conditions - lifecycle. Selected stages of the desing will be realized with a modern computers software.					45
Student workload - forms of activity							Number of hours
A-W-1		Lecture participation					15
A-W-2		Individual literature studies					35
A-W-3		Repetition of the lecture content to the written test					7
A-W-4		One-on-On Teaching Consultation					3
A-L-1		Classroom participation					45
A-L-2		Preparation of reports					30
A-L-3		Literature studies					10
A-L-4		One-on-one teaching consultations					5
Teaching methods / tools							
M-1		Lecture					
M-2		Laboratory classes					

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Evaluation methods (F - progressive, P - final)									
S-1	P	Written final exam based on the lecture contents							
S-2	F	Project report							
S-3	F	Active participation in laboratory classes.							
Designed learning outcomes		Reference to the learning outcomes designed for the fields of study	Reference to the learning outcomes defined for the particular areas of education	Reference to learning outcomes leading to the degree of "inżynier"	Course objectives	Course content		Teaching methods	Evaluation methods
Knowledge									
ChEn_1A_C15_W01 Student has a structured, theoretical and practical knowledge about the processes system designing, including elements of the process design and design strategy. Student has knowledge about selecting processes and parameters of their work, design heuristics and simulation software.		ChEn_1A_W07 ChEn_1A_W08 ChEn_1A_W12 ChEn_1A_W14 ChEn_1A_W20	P6S_WG_TA11	P6S_WG_IA11	C-1	T-W-1 T-W-2	T-W-3 T-W-4	M-1	S-1
Skills									
ChEn_1A_C15_U01 Student possesses an ability to assess the conditions that have to be met for the implementation of a project, involving the construction or modernization of the installation. Student possesses an ability to design the process.		ChEn_1A_U01 ChEn_1A_U03 ChEn_1A_U05 ChEn_1A_U07 ChEn_1A_U08 ChEn_1A_U09 ChEn_1A_U16	P6S_UO P6S_UU P6S_UW_TA11 P6S_UW_TA12 P6S_UW_TA14	P6S_UW_IA11 P6S_UW_IA12 P6S_UW_IA14	C-2	T-L-1 T-W-1 T-W-2	T-W-3 T-W-4	M-2	S-2 S-3
Other social / personal competences									
ChEn_1A_C15_K01 Student understands the need to train and improve his/her professional and personal competences. Student is able to teamwork and to properly define the priorities for the implementation of the task - a process project.		ChEn_1A_K01 ChEn_1A_K03 ChEn_1A_K04 ChEn_1A_K05	P6S_KK P6S_KO P6S_KR		C-2	T-L-1		M-2	S-2 S-3
Required reading									
1. A.M.Kutepov; T.I.Bondareva; M.G.Berengarten, Basic Chemical Engineering with Practical Applications, Mir Publishers, Moscow, 1988, 1									
2. M.D. Himmelblau, Basic Principles and Calculations in Chemical, Prentice Hall PTR, New Jersey, 1996, 6									
Supplementary reading									
1. R. Smith, Chemical Process Design and Integration, John Wiley & Sons, Ltd, 2005									
2. W.D. Seider; J.D. Seader; D.R. Lewin, Process Design Principles, John Wiley & Sons, Inc, New York, 1999									