Zachodniopomorski Uniwersytet Technologiczny w Szczecinie

Faculty of Chemical Technology and Engineering

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	**Chemical Engineering Thermodynamics**		
Code	ChEn_1A_S_C10		
Field of specialisation			
Administering faculty	Institute of Chemical Engineering and Environmental Protection Processes		
ECTS	6,0	*ECTS (forms)*	6,0
Form of course credit	examination	*Language*	english
Electives		*Elective group*	

Form of instruction	*Code*	*Semester*	*Hours*	*ECTS*	*Weight*	*Credit*
lecture	W	4	30	2,0	0,40	examination
lecturing course	A	4	30	2,0	0,30	credits
laboratory course	L	4	30	2,0	0,30	credits

Leading teacher	Witkiewicz Konrad (Konrad.Witkiewicz@zut.edu.pl)
Other teachers	Witkiewicz Konrad (Konrad.Witkiewicz@zut.edu.pl)

Prerequisites	
W-1	Basic knowledge of mathematics.

Module/course unit objectives	
C-1	To acquaint students with the basic concepts of process thermodynamics.
C-2	Developing the ability to solve tasks in the field of process thermodynamics.
C-3	The formation of an open attitude to the joint search for solutions to problems in the field of process thermodynamics.

Course content divided into various forms of instruction		*Number of hours*
T-W-1	The first law of thermodynamics, entropy and the second law of thermodynamics, equations of state and intermolecular forces, thermodynamic properties of fluids, thermodynamic analysis of flow processes, exergy, thermodynamic cycles, solution thermodynamics, phase equilibria, chemical reaction equilibria, thermodynamic analysis of processes.	30
T-A-1	Calculation of thermodynamic properties of fluids. Analysis of flow processes. Energy, exergy and entropy balances of processes. Calculation of phase equilibria. Thermodynamic analysis of thermodynamic cycles and processes.	30
T-L-1	Parameters of moist air. Heat of solids combustion. Gas-solid equilibirum. Isosteric heat of adsorption. Crystallization equilibrium.	30

Student workload - forms of activity		*Number of hours*
A-W-1	Participation in lectures	30
A-W-2	Written exam	2
A-W-3	Self-study of the literature	26
A-W-4	Consultations	2
A-A-1	Participation in classes	30
A-A-2	Written test	2
A-A-3	Self-study of the literature	28
A-L-1	Participation in laboratories	30
A-L-2	Preparation of reports	5
A-L-3	Self-study of the literature	23
A-L-4	Written tests	2

Teaching methods / tools	
M-1	Lecture
M-2	Classes
M-3	Laboratories

Evaluation methods (F - progressive, P - final)		
S-1	P	Lecture - written exam
S-2	F	Classes - written test
S-3	F	Laboratories - written reports
S-4	P	Laboratories - written tests

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_C10_W02 Student demonstrates knowledge of chemical and process thermodynamics	ChEn_1A_W10 ChEn_1A_W15	P6S_WG_TA11	P6S_WG_IA11	C-1	T-A-1 T-W-1 T-L-1	M-1 M-2 M-3	S-1 S-2 S-3 S-4
Skills							
ChEn_1A_C10_U01 Student can solve problems associated with thermodynamic systems.	ChEn_1A_U01 ChEn_1A_U03 ChEn_1A_U05 ChEn_1A_U08 ChEn_1A_U10 ChEn_1A_U16	P6S_UO P6S_UU P6S_UW_TA11 P6S_UW_TA13 P6S_UW_TA14	P6S_UW_IA11 P6S_UW_IA14	C-2	T-A-1 T-L-1	M-2 M-3	S-2 S-3 S-4
Other social / personal competences							
ChEn_1A_C10_K01 Student understands the need for continuous training and development in the field of chemical and process thermodynamics.	ChEn_1A_K01 ChEn_1A_K03 ChEn_1A_K04 ChEn_1A_K05	P6S_KK P6S_KO P6S_KR		C-3	T-L-1	M-3	S-3 S-4

Required reading

1. B.G. Kyle, Chemical and Process Thermodynamics, Prentice Hall PTR, New Jersey, 1999
2. H.D.B. Jenkins, Chemical Thermodynamics at Glance, Blackwell Publishing Ltd, Oxford, 2008
3. M.D. Koretsky, Engineering and Chemical Thermodynamics, John Wiley & Sons, Hoboken, NJ, 2004
4. H.S. Fogler, Elements of chemical reaction engineering, Prentice Hall International Series in the Physical and Chemical Engineering Sciences, New Jersey, 2006, 4th ed.
5. D. Kondepudi, Introduction to modern thermodynamics, John Wiley & Sons Inc., Chichester, UK, 2008

Supplementary reading

1. B.G. Kyle, Chemical and Process Thermodynamics, Prentice-Hall International, Boston, 1999