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	**Water Technology and Reclamation**		
Code	ChEn_1A_S_C23		
Field of specialisation			
Administering faculty	Institute of Inorganic Chemical Technology and Environmental Engineering		
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	6	30	3,0	0,50	examination
laboratory course	L	6	30	3,0	0,50	credits

Leading teacher	Morawski Antoni (Antoni.Morawski@zut.edu.pl)
Other teachers	Morawski Antoni (Antoni.Morawski@zut.edu.pl)

Prerequisites	
W-1	Knowledge of water chemistry.
W-2	Knowledge of basis for ech processes and oparation unit.

Module/course unit objectives	
C-1	Knowledge of technology of water production and wastewater purification

Course content divided into various forms of instruction		*Number of hours*
T-W-1	Natural Water (groudwater and surface water)	2
T-W-2	Industrial water. Urban effluent. Industrial effluent.	2
T-W-3	Coagulation-flocculation. Chemical precipitation. Sedimentation. Flotation.	4
T-W-4	Filtration. Membrane separation. Adsorpton.	4
T-W-5	Water analysis and treatability.	2
T-W-6	Aquatic organisms and biological processes. Methane fermentation.	3
T-W-7	Corrosion in metal and concrete. Apparatus for water and wastewater tretment.	3
T-W-8	Sludge treatment.	2
T-W-9	Reagent storage and feeding	2
T-W-10	Intrumentation, control and regulation in water and wastewater treatment.	2
T-W-11	Oxidation and desinfection	4
T-L-1	Chemical and instrumental water and waste water analysis.	6
T-L-2	Water and wastewater treatment by coagulation and sedimentation.	6
T-L-3	Desalination of water by membranes (Reverse osmosis,Nanofiltration, ultrafiltration)	6
T-L-4	Clarification of water by membranes (Ultrafiltration, Microfiltration).	6
T-L-5	Advanced oxidation treatment of water (photocatalysis).	6

Student workload - forms of activity		*Number of hours*
A-W-1	Home work by students	30
A-W-2	Participation in lectures.	30
A-W-3	Studies on literature .	30

Student workload - forms of activity		*Number of hours*
A-L-1	Participation in laboratories activity.	60
A-L-2	Laboratory reports preparation.	30

Teaching methods / tools	
M-1	Wykłady

Evaluation methods (F - progressive, P - final)		
S-1	F	Egzamin pisemny

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_C23_W01 Knows the princples for each steps of water production as well as wastewater purification and menagement.	ChEn_1A_W05 ChEn_1A_W20	P6S_WG_TA11		C-1	T-L-1 T-W-6 T-L-2 T-W-7 T-L-3 T-W-8 T-L-4 T-W-9 T-L-5 T-W-10 T-W-4 T-W-11 T-W-5	M-1	S-1
Skills							
ChEn_1A_C23_U01 Ability for proposal technology for each kind of water composition.	ChEn_1A_U01 ChEn_1A_U03 ChEn_1A_U05 ChEn_1A_U08 ChEn_1A_U16	P6S_UO P6S_UU P6S_UW_TA11 P6S_UW_TA14	P6S_UW_IA11 P6S_UW_IA14	C-1	T-L-1 T-W-6 T-L-2 T-W-7 T-L-3 T-W-8 T-L-4 T-W-9 T-L-5 T-W-10 T-W-4 T-W-11 T-W-5	M-1	S-1
Other social / personal competences							
ChEn_1A_C23_K01 Ability to govern of technology set-up and play the lider function of team.	ChEn_1A_K01 ChEn_1A_K03 ChEn_1A_K04 ChEn_1A_K05	P6S_KK P6S_KO P6S_KR		C-1	T-L-1 T-W-6 T-L-2 T-W-7 T-L-3 T-W-8 T-L-4 T-W-9 T-L-5 T-W-10 T-W-4 T-W-11 T-W-5	M-1	S-1

Required reading

1. team of authors, Water Treatment Handbook, Vol. 1 and Vol.2, Degrement SUEZ, Lavoisier SAS, 94236 Cachan Cedex, France; www.lavoisier.fr, 2011, Seventh edition, ISBN 978-2-7430-0970-0

Supplementary reading

1. Water Research, Elsevier, International Journal