Course Structure Diagram 2015-2016
Master of Science (Technology) in Environmental Engineering
2 years, 120 ECTS Credits

Study option of Automation Technology (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
AUTOMATION TECHNOLOGY, 60 ECTS										
477523S	Simulation	5		5						
477524S	Process Optimization	5			5					
477623S	Process Information System	10			5	5				
477624S	Control System Methods	5	5							
477607S	Advanced Control and Systems Engineering	5		5						
477525S	Computational intelligence in automation	5		5						
	Choose 5 courses from following									
031080A	Signal Analysis	5		5						
477506S	Modelling and Control of Biotechnological Processes	5					5			
477507S	Automation in Pulp and Paper Industry	5						5		
477508S	Automation in Metallurgical Industry	5				5				
477625S	Power Plant Automation	5			5					
477713S	Automation in Mineral Processing	5				5				
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5		5						
	Free choice courses	20					10	10		
MASTER'S THESIS, 30 ECTS										
477991S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120		30		30		30		30

Study option of Bioproducts and Bioprocess Engineering (2 years, 120 ECTS credits), Bioprocess Engineering

Course			Semester							
Code	Name	ECTS	1stAutumn		1st Spring		2nd Autumn		2nd Spring	
BIOPRODUCTS AND BIOPROCESS ENGINEERING, 30/60 ECTS										
Bioprocess Engineering										
488321S	Bioreactor technology	5		5						
488305S	Advanced course for biotechnology	5			5					
488311S	Industrial Microbiology	5		5						
488322S	Bioprocess Engineering	5				5				
740148A	Biomolecules	5	2,5		2,5					
740149A	Metabolism I	5				5				
477506S	Modeling and control of biotechnological processes	5					5			
477204S	Chemical Engineering Thermodynamics	5	5							
477308S	Multicomponent Mass Transfer	5				5				
477306S	Non-ideal reactors	5		5						
477224S	Biorefineries	5						5		
477223S	Advanced Process Design	5				5				
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5						5		
	Free choice courses	20					10	10		
MASTER'S THESIS, 30 ECTS										
477983S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120		27,5		32,5		30		30

Study option of Bioproducts and Bioprocess Engineering (2 years, 120 ECTS credits), Bioproduct Technology

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
BIOPRODUCTS AND BIOPROCESS ENGINEERING, 30/60 ECTS										
Bioproduct Technology										
477123S	Chemical Processing of Biomasses	5	5							
477124S	Mechanical Processing of Biomasses	5		5						
477125S	Recycling of Bioproducts	5			5					
477126S	Manufacturing of fibre products	5				5				
477127S	Research Training of Bioproduct Technology	10					5	5		
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5		5						
	Free choice courses, 30 ECTS from the other study option	50	10	5	5	10	10	10		
MASTER'S THESIS, 30 ECTS										
477983S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120		30		30		30		30

Study option of Chemical Engineering (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
CHEMICAL ENGINEERING (2), 60 ECTS										
477306S	Non-ideal reactors	5		5						
477309S	Process and environmental catalysis	5	5							
477310S	Advanced catalytic processes (1)	5						5		
477311S	Advanced separation processes (2)	5		5						
477308S	Multicomponent Mass Transfer	5				5				
477305S	Flow Dynamics	5	5							
477204S	Chemical Engineering Thermodynamics	5	5							
477209S	Chemical Process Simulation	5	2,5	2,5						
477524S	Process Optimization	5			5					
477223S	Advanced Process Design	5				5				
477224S	Biorefineries	5						5		
477207S	Industrial Water and Wastewater Technologies	5			5					
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5						5		
	Free choice courses	20				5	10	5		
MASTER'S THESIS, 30 ECTS										
477984S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120		30		30		30		30

Study option of Extractive Metallurgy (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
EXTRACTIVE METALLURGY, 30 ECTS										
477412S	Phenomena-based modelling in extractive metallurgy	10	5	5						
477413S	Experimental Research in Extractive Metallurgy	10			5	5				
477414S	Process Simulation in Extractive Metallurgy	10					5	5		
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5		5						
	Free choice courses, 30 ECTS from the other study option	50	10	5	5	10	10	10		
MASTER'S THESIS, 30 ECTS										
477985S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120	30		30		30		30	

Study option of Mineral Processing (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
MINERAL PROCESSING, 60 ECTS										
477710A	Basic Course in Geology	5	5							
477704A	Principles of Mineral Processing	5		5						
477716A	Surface Chemistry Principles of Minerals	5			5					
477711S	Rock and Mining Engineering	5		5						
477712S	Phenomena in Mineral Processing	5				5				
477713S	Automation in Mineral Processing	5				5				
488115A	Geomechanics	5		5						
477207S	Industrial Water and Wastewater Technologies	5			5					
488221S	Environmental Load of Industry	5			5					
488203S	Industrial Ecology	5		5						
488133A	Environmental Impact Assessment (1)	5					5			
477715S	Environmental and Social Responsibility in Mining	5						5		
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5		5						
	Free choice courses	20					10	10		
MASTER'S THESIS, 30 ECTS										
477986S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120	30		30		30		30	

Study option of Industrial Energy and Environmental Engineering (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
INDUSTRIAL ENERGY AND ENVIRONMENTAL ENGINEERING, 60 ECTS										
477223S	Advanced Process Design	5				5				
477224S	Biojalostamot	5						5		
477309S	Process and environmental catalysis	5					5			
488133A	Environmental Impact Assessment (1)	5					5			
488104A	Industrial and Municipal Waste Management (ymp kandissa)	5					5			
488110S	Water and Wastewater Treatment	5	5							
488202S	Production and Use of Energy	5	5							
488203S	Industrial Ecology	5		5						
488204S	Air Pollution Control Engineering	5		5						
488221S	Environmental Load of Industry	5			5					
488402A	Sustainable Energy Project	5			2,5	2,5				
477307S	Research Methodology	5	1	1	1,5	1,5				
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5		5						
	Free choice courses		3			7	5	10		
MASTER'S THESIS, 30 ECTS										
477987S	Master's Thesis	30							15	15
470313S	Maturity Test	0								0
		120		30		30		30		30

Study option of Water and Geo Engineering (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1st Autumn		1st Spring		2nd Autumn		2nd Spring	
WATER AND GEO ENGINEERING (2), 60 ECTS										
488133A	Environmental Impact Assessment (1)	5					5			
488110S	Water and Wastewater Treatment	5	5							
488108S	Groundwater Engineering	5				5				
488127S	Field measurements, site investigations and geotechnical tests	5	2,5	2,5						
488128S	Laboratory test in water resources engineering	5			2,5	2,5				
488121S	Introduction to Civil Engineering	5	5							
488105A	Water Supply Networks	5			5					
488117S	Water Resources Management (2)	5		5						
Water Engineering Choose 4 courses**										
488122S	Statistical Methods in Hydrology (2)	5		5						
488124S	Advanced Course in Hydrology (1)	5					5			
488113S	Basics of surface water quality modelling (1)	5						5		
488123S	River Engineering and Hydraulic Structures (1)	5						5		
488131S	Geoenvironmental Engineering	5	5							
Geo Engineering Choose 4 courses**										
488111S	Modelling in Geoenvironmental Engineering	5				5				
460163S	Foundation Engineering	5			5					
488131S	Geoenvironmental Engineering	5	5							
488123S	River Engineering and Hydraulic Structures (1)	5						5		
488132S	Cold Climate Engineering	5			5					
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5						5		
	Free choice courses, Water Engineering	20				10	10			
	Free choice courses, Geo Engineering	20		5			5	10		
MASTER'S THESIS, 30 ECTS										
477989S	Master's Thesis	30							15	15
470313S	Maturity Test	0								
	Water Engineering (2)			30		30		30		30
	Geo Engineering			30		30		30		30