

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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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						
	<i>Choose 5 courses from following</i>									
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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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 Industrial Engineering (2 years, 120 ECTS credits)

Course			Semester							
Code	Name	ECTS	1 st Autumn		1 st Spring		2 nd Autumn		2 nd Spring	
INDUSTRIAL ENGINEERING, 30 ECTS										
555285A	Project management *	5			2,5	2,5				
555242A	Product development *	5	5							
555226A	Operations and production *	5	2,5	2,5						
555286A	Process and quality management	5				5				
555390S	Statistical Process Management	5	2,5	2,5						
555389S	Systematic Improvement of Production Processes **	10	5	5						
555305S	Research Project in Industrial Engineering and Management **	10	5	5						
	* Choose two courses									
	** Choose one course									
	Free choice courses 30 ECTS from the other study option	30		5	7,5	7,5				
SUPPLEMENTARY COURSES, 30 ECTS										
031022P	Numerical Analysis	5			5					
477005S	Advanced Practical Training	5		5						
	Free choice courses	20					15	15		
MASTER'S THESIS, 30 ECTS										
477988S	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	1 st Autumn		1 st Spring		2 nd Autumn		2 nd 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