Metropolia UAS **Biotechnology and Chemical Engineering 31.1.2022**		extent of credits	Strong engineering skills in mathematics and scienc	Good interaction skills	Skills to conduct projects	Clean and sustainable production technologies	Clean water production	Efficiency for using materials and energy	**Learning to learn**	**Ethics**	**Operating in a workplace**	**Sustainable development**	**Internationality and multiculturalism**	**Proactive development**
1st Year of study	**Orientation to Biotechnology and Chemical Engineering**	**30**												
	Orientation to Field and Studies	5		x					x	x	x			
	Fundamentals of Chemistry 1	5	x						x			x		
	Introductory Project and Professional Communication	5	x	x	x				x		x			
	Fundamentals of Chemistry 2	5	x						x					
	Fundamentals of Mathematics and Natural Sciences 1	5	x						x					
	Fundamentals of Mathematics and Natural Sciences 2	5	x						x					
	Introduction to the Industry	**30**												
	The World of Microbes	5				x	x					x		
	Math and Science Basics 3	5	x						x				x	
	Project Course in Biotechnology and Chemical Engineering	10	x	x	x						x	x		
	Analytical and Organic Chemistry	5	x				x		x					
	Industrial Processes and Materials	5				x	x	x	x			x		
	In total	60												
2nd Year of study	**Becoming an Expert in Biotechnology and Chemical Engineering**	**30**												
	Engineering Chemistry	5	x					x						
	Food Chemistry and Nutrition	5	x			x		x		x		x		
	Statistics and Design of experiments	5	x					x						
	Fluid mechanics and heat transfer basics	5	x		x	x	x	x	x			x		
	Basics of Materials technology	5	x					x				x		
	Engineering English and Communication Skills	5		x					x				x	
	Becoming an Engineer in Biotechnology and Chemical Engineering	**30**												
	Process Design Basics	5	x			x		x	x					
	Health, Safety and Environmental Responsibility	5	x			x	x	x		x		x		
	Industrial Business	5			x				x	x	x	x	x	
	Automation Technology	5	x				x							
	Process Operation Control and Maintenance	5	x			x	x	x		x				
	Engineering Swedish	5		x					x				x	
	Finnish as a Second Language: Finnish at Work	5		x					x				x	
	In total	60												
3rd Year of study	**Phenomena and Unit Operations in Chemical Engineering**	**30**												
	Equilibria and kinetics	5	x			x								
	Phenomena and material and energy balances in Process Technology	5	x			x	x	x				x		
	Unit processes 1	5	x				x							
	Fluid Mechanics and Heat Transfer advanced course	5	x			x	x	x						
	Plant Design basics	5			x	x	x	x				x		
	Reactors and Catalysis	5	x			x								
	Innovation and Sustainable Design of Processes	**30**												
	Multidisciplinary Innovation Project	10	x	x	x		x	x	x		x	x	x	
	Unit processes 2	5	x			x	x							
	Piping design	5	x			x								
	Plant Design Advanced Course	5	x		x	x	x	x				x		
	Lab Workshop, Chemical Engineering	5	x	x		x	x		x				x	
	In total	60												
4th Year of study	**Bachelor's Thesis**	**15**												
	Bachelor's Thesis	15	x	x	x	x	x	x	x			x		
	Work Placement	**30**												
	Work Placement 1	15		x							x	x	x	
	Work Placement 2	15		x		x	x				x	x	x	
	Elective Studies	**15**												
	In total	60												