Metropolia UAS
Biotechnology and Chemical Engineering, Clean Production Technologies 31.1.2024

		extent of credits	Strong engineering skills in mathematics and science	Good interaction skills	Skills to conduct projects	Clean and sustainable production technologies	Know-how for circular economy and sustainable developmen	Clean water production	Efficiency for using materials and energy	**Learning competence**	**Ethical competence**	**Working community competence**	**Innovation competence**	**Multicultural competence**	**Technological competence**
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	x		
	Engineering English and Communication Skills	5		x						x				x	
	Fundamentals of Engineering Mathematics	5	x							x					
	Fundamentals of Physics	5	x							x					
	Introduction to the Industry	**30**													
	Functions and differentials	5	x							x				x	
	The World of Microbes	5				x	x	x							x
	Fundamentals of Chemistry 2	5	x							x					
	From Raw Materials to Products	5	x				x		x						x
	Analytical and Organic Chemistry	5	x					x		x					x
	Project Course in Biotechnology and Chemical Engineering	5				x	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						x
	Basics of Python Programming	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			x		x
	Engineering Physics	5	x							x					
	Properties and Phenomena of Materials	5				x	x	x							x
	Becoming an Engineer in Biotechnology and Chemical Engineering	**30**													
	Process Design Basics	5	x			x			x	x					x
	Health, Safety and Environmental Responsibility	5	x			x	x	x	x		x				x
	Industrial Business	5			x		x			x	x	x		x	x
	Automation Technology	5	x					x							x
	Process Operation Control and Maintenance	5	x			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	**Sustainable Production Management**	**20**													
	Modern Production Plant	5	x			x									x
	Ecological Management of Material and Energy Balances	5	x			x	x	x	x						x
	Energy-efficient Production	5	x					x							x
	Sustainable Production	5	x			x		x	x						x
	Designing Future Processes	**30**													
	Physico-Chemical Processing of Renewable Raw Materials	5	x			x									
	Resource-efficient Design of a Modern Production Plant	5	x			x		x							x
	Mechanical Processing of Renewable Raw Materials and P	5	x			x		x							
	Phenomena and Reactors in Biochemical and Chemical En	5	x			x									x
	Future Production Plant	5	x		x	x	x	x	x						x
	Processing of Bio-Based Materials	5	x	x		x		x		x				x	x
	Innovation Project	**10**													
	Multidisciplinary Innovation Project	10	x	x	x		x	x	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			x		x
	Work Placement	**30**													
	Work Placement 1	15		x			x					x	x	x	x
	Work Placement 2	15		x		x	x	x				x	x	x	x
	Elective Studies	**15**													
	In total	60													