Metropolia UAS **Biotechnology and Chemical Engineering, Biotechnology and Food Engineering 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 developmer	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
	Beyond the Surface of Foods	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					
	Industrial Microbiology and Production Hygiene	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	**Utilization of Microbes in Production**	**20**													
	Fermentation Technology	5	x			x	x	x	x						x
	Gene Technology and Basics in Bioinformatics	5	x			x	x	x	x	x	x				x
	Beer Project					x	x	x		x	x				
	Fermentation Processes	5				x	x			x	x				
	Sustainable Product Development	**20**													
	Bioindustrial Processes and Raw Materials	5	x				x		x						x
	Sustainable Product Development	10	x			x	x	x	x		x		x		x
	Sensory evaluation	5		x	x				x	x		x	x		
	Sustainable Production	**10**													
	Quality and Product Safety	5	x			x	x	x			x				x
	Packaging Design	5			x	x	x	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													