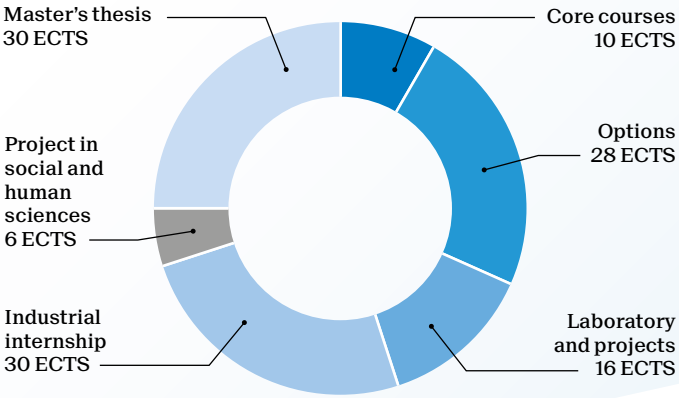
Master of Science in

CHEMICAL ENGINEERING AND BIOTECHNOLOGY

2-year program - 120 ECTS



Students may opt for a 30 ECTS catalysis/sustainability specialization. In this case, 18 ECTS of specialization labeled courses must be taken on top of the core courses and the chemical engineering lab and project.

	Spec.	Credits
Catalysis/sustainability core courses		**8**
Automated and data-driven laboratories	●	2
Sustainable chemicals manufacture: concepts/tools	●	4
Sustainable chemistry and chemical engineering in Industry	●	2

Options		**18**
Catalysis		
Advanced nuclear magnetic resonance	●	3
AI for chemistry	●	3
Asymmetric catalysis for fine chemicals synthesis	●	3
Catalyst design for synthesis	●	2
Energy conversion by semiconductor devices	●	2
Machine learning for physicists	●	6
Optical methods in chemistry	●	3
Sustainability		
Environmental Economics	●	4
Environmental system analysis and assessment	●	5
Fate and behaviour of environmental contaminants	●	4
Introduction to ethics and critical thinking	●	3
Process intensification and green chemistry	●	3
Science of climate change	●	4

Students may also opt for a 30 ECTS minor instead of the industrial internship.
Recommended minors:

- Engineering for sustainability
- Materials science and engineering
- Physics

	Spec.	Credits
Core courses		**10**
Chemical engineering		
Diffusion and mass transfer		4
Heterogeneous reaction engineering	●	4
Management and safety		
Safety of chemical processes	●	2

Options		**28**
Theme A: Energy and sustainability		
Automated and data-driven laboratories	●	2
Catalysis for emission control and energy processes	●	3
Catalysis for energy storage	●	3
Modeling and optimization of energy systems		4
Nanomaterials for chemical engineering application		3
Solid state chemistry and energy applications		3
Sustainable chemicals manufacture: concepts/tools	●	4
Sustainable chemistry and engineering in industry	●	2
Thermodynamics of energy conversion and storage		3
Theme B: Biotechnology		
Bioprocesses and downstream processing	●	4
Biotechnology lab	●	4
Food biotechnology		2
Nanobiotechnology		3
Principles and applications of systems biology		3
Selected topics in life sciences		3
Synthetic biology		4
Theme C: Materials and food engineering		
Chemistry of food processes		2
Chimie des denrées alimentaires		2
Entrepreneurship in food and nutrition science		4
Food biotechnology		2
Organic electronic materials		4
Physical and chemical analyses of materials	●	3
Physical chemistry of polymeric materials		4
Polymer chemistry and macromolecular engineering		3
Risk management	●	2
Solid state chemistry and energy applications		3
Sustainability and materials	●	3

Laboratory and projects		**16**
Chemical engineering lab and project	●	4
Chemical engineering product design		4
Process development		8

School of Basic Sciences
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