Biotechnology Skill tree – curriculum 10.2022

Core subjects

- Bioprocess engineering I (VU) – 4
- Cell and Molecular Biology I (VO) – 4
- Cell factories (VO) – 4
- Biological nanoscience and nanotechnology (VO) – 2
- Mechanical and thermal process technology II (VO) – 2
- Engineering of biotechnological production facilities (VO) – 2
- Applied mathematics and biostatistics (VO) – 2
- Applied mathematics and biostatistics exercises (UE) – 1
- Computing skills for biotechnology (VU) – 2
- Patent law and strategic patent management (VO) – 2
- Biophysical chemistry (VU) – 3
- Quality management in biotechnology (VU) – 3
- Practical course in biochemistry II (UE) – 5
- Laboratory course in molecular biology II (UE) – 3

Electives

1 | 1 | 1 | 1 | 1

Internship

1 | 1 | 1

Free Electives

1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1

Specialization

Only up to 6 ECTS from UE or PR

Bioinformatics

Statistics with R (VU)	2
Introduction to programming (VU)	3
Essentials for bioinformatics data analysis (VU)	3
Multivariate statistics (VU)	3
Modelling and simulation of biomolecules (VU)	3
Introduction to metabolic modelling (VU)	2
High-throughput sequencing and genome analysis (VS)	3
Bioinformatics: Selected aspects (VU)	3
Machine learning and pattern recognition (VU)	4
Bioinformatics lab rotation (VU)	2

Environmental Biotechnology

Biotechnology for sustainable processes and environmental protection (VO)	4
Methods in environmental biotechnology (UE)	3
Environmental bioprocess engineering (VO)	4
Industrial water management (VO)	3
Global waste management I (VO)	3
Renewable energy resources (VX)	3
Fundamentals of environmental biotechnology (VO)	3
Microbial ecology (VS)	2
Environmental and biotechnological analysis (VO)	3

Medical Biotechnology

Protein chemistry and protein engineering (VU)	4
Cell and molecular biology II (VO)	3
Immuno- and vascular biology in health and disease (VO)	2
Pathophysiology for biotechnologists (VO)	2
Oncology for biotechnologists (VO)	2
Preclinical studies (VO)	1
Clinical studies (VS)	1
Up- and downstream-processing (VO)	3
Infectious diseases and vaccines (VS)	2
Stem cells and tissue engineering (VO)	3
Biological therapeutics (VO)	2
Practical course in cell culture and fermentation (UE)	3

Plant Biotechnology

Crop plant science (VO)	2
Plant molecular biology (VO)	3
Plant biochemistry and cell biology (VO)	2 ½
Molecular plant breeding (VO)	3
Safety aspects of plant biotechnology (VO)	3
Practical course in plant biotechnology (UE)	4 ½
Structure and analysis of genomes (VO)	3
Genetic control of secondary metabolites in perennial crop plants (VS)	3
Biopolymers for sustainable utilization (VO)	2
Plant polysaccharide analysis (VO)	2

Bioprocess Engineering

Metabolic and cell engineering (VO)	2
Introduction to metabolic modelling (VU)	2
Up- and downstream-processing (VO)	3
Bioprocess engineering II (VU)	4
Bioprocess engineering laboratory (UE) (Bioprocess engineering I + II are prerequisites)	5
Products and processes in biotechnology (VS)	2
Process simulation (VU)	2
Biochemical reaction engineering (VO)	2
Protein chemistry and protein engineering (VU)	4
Biopolymers for sustainable utilization (VO)	2

Protein Engineering

Structure and function of proteins (VO)	2
Protein engineering (VO)	3
Methods in protein characterization (VU)	4
Introduction into crystallography and NMR spectroscopy of proteins (VO)	3
Modelling and simulation of biomolecules (VU)	3
Enzyme reactions: mechanisms and kinetics (VO)	2
Applied biocatalysis (VO)	3
Antibody engineering (VO)	3
Practical course in protein engineering and technology (PR)	5