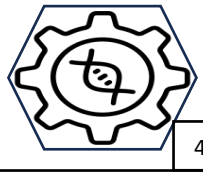
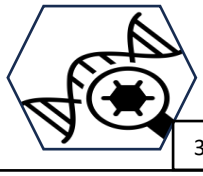
Biotechnology Skill tree – curriculum 10.2023

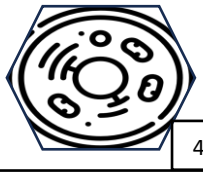
Core subjects



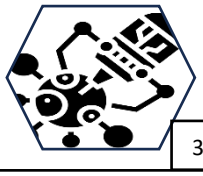
4 — **Bioprocess engineering I**



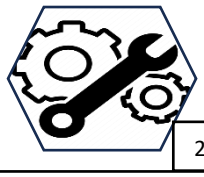
3 — **Cell and Molecular Biology**



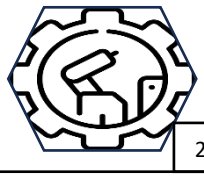
4 — **Cell factories**



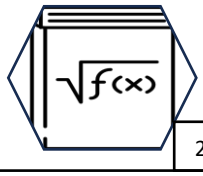
3 — **Biological nanoscience and nanotechnology**



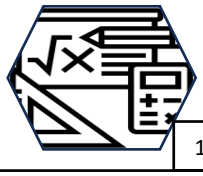
2 — **Mechanical and thermal process technology II**



2 — **Engineering of biotechnological production facilities**



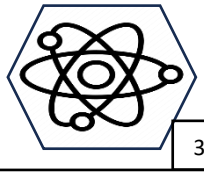
2 — **Applied mathematics and biostatistics**



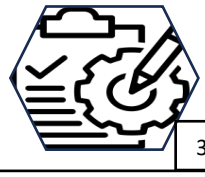
1 — **Applied mathematics and biostatistics exercises**

2 — **Computing skills for biotechnology**

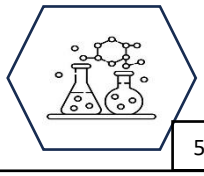
3 — **Patent law and strategic patent management**



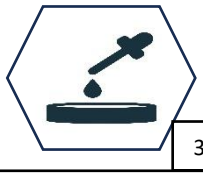
3 — **Biophysical chemistry**



3 — **Quality management in biotechnology**



5 — **Practical course in biochemistry II**



3 — **Laboratory course in molecular biology II**

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

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

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

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

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

Bioprocess Engineering	
Metabolic and cell engineering	2
Introduction to metabolic modelling	2
Up- and downstream-processing	3
Bioprocess engineering II	4
Bioprocess engineering laboratory	5
Products and processes in biotechnology	2
Process simulation	2
Biochemical reaction engineering	2
Protein chemistry and protein engineering	4
Biopolymers for sustainable utilization	2

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