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Curriculum for the **Master's Programme in Microbiology** at the Faculty of Biology at the University of Innsbruck

(New release 2025)

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§ 1 Allocation of the study programme

Pursuant to §54 para. 1 Universities Act 2002, the Master's Programme in Microbiology is allocated to the group of natural science study programmes.

§ 2 Admission

(1) Admission to the Master's Programme in Microbiology requires the completion of a relevant bachelor's programme or a relevant bachelor's degree completed at a university of applied sciences or another equivalent degree programme passed at a recognised national or international postsecondary educational institution.

(2) In any case, the completion of the Bachelor's Programme in Biology at the University of Innsbruck is deemed to be a subject-relevant study programme. The Rectorate decides on the relevance of another subject-relevant study programme pursuant to §64 para. 3 Universities Act.

(3) In order to compensate for significant subject-related differences, supplementary examinations totalling a maximum of 30 ECTS-Credits may be prescribed, which must be taken by the end of the second semester of the master's programme. The Rectorate may determine which of these supplementary examinations are a prerequisite for taking the examinations provided for in the master's degree programme curriculum.

§ 3 Qualification profile

(1) The Master's Programme in Microbiology provides in-depth scientific professional training on the basis of a relevant bachelor's programme.

(2) Graduates of the Master's Programme in Microbiology have both, the necessary knowledge and the required skills and competences to develop and implement methodologically sound solutions to subject-specific questions in microbiology.

(3) Graduates are able to work scientifically on microbiological issues and apply the skills they have acquired in an interdisciplinary manner.

(4) Graduates have the competence to develop their knowledge independently further in the field of microbiology.

(5) Graduates can plan complex scientific experiments and analyse and interpret their results using suitable statistical methods. They are able to process large data sets ('big data') and analyse them in a targeted manner using current methods.

(6) Graduates are able to analyse issues and problems in a scientifically sound manner, work on them on the basis of scientific theories and solve them using relevant methods. This competence enables them to work on relevant problems in their respective professional fields in a scientifically sound and practice-orientated manner. Possible professional activities are

- scientific and managerial activities in private and public companies and institutions (e.g. in the fields of environmental protection, agriculture, forestry, water and waste management, (environmental) biotechnology, food production and control, pharmacy, medicine, forensics, hygiene, health organisations, genetics, genomics, bioinformatics, research funding and public administration), in museums, protected areas and non-profit organisations.
- consultancy, appraisal and expert activities (e.g. in the fields of environmental protection and nature conservation, agriculture, forestry, water and waste management, (environmental) biotechnology, medicine and hygiene) for private and public companies and institutions.
- research and teaching activities at universities, universities of applied sciences and other national and international research institutions.

(7) In addition to subject-specific skills, the Master's Programme in Microbiology also promotes non-subject-specific social skills, such as teamwork and oral and written communication skills.

(8) Completion of the Master's Programme in Microbiology qualifies students for admission to a relevant doctoral programme/PhD programme.

§ 4 Scope and duration

The Master's Programme in Microbiology coves 120 ECTS-Credits. This corresponds to a duration of four semesters. One ECTS-Credit corresponds to a workload of 25 hours.

§ 5 Types of courses and maximum number of students per course

(1) Courses without continuous performance evaluation:

Lectures (VO) are courses held in lecture format. They introduce the research areas, methods and schools of thought for a given subject. No maximum number of students per course.

(2) Courses with continuous performance evaluation:

1. Working Groups (AG) serve to treat a topic in collective fashion, examining the theories, methods and techniques of an area using group work. Maximum number of students: 12–30.
2. Excursions (EX) conducted outside the premises of the university, serve to demonstrate and deepen course contents. Maximum number of participants: 12–25.
3. Proseminars (PS) introduce students interactively to a subject area and impart knowledge and methods of scientific working. Maximum number of students: 12–30.
4. Seminars (SE) provide in-depth study of contents, methods and techniques of a specialist area including presentations and discussions. Maximum number of students: 12–30.
5. Tutorials (UE) focus on the practical treatment of concrete scientific tasks within an area. Maximum number of participants: 6–16.
6. Lecture-tutorials (VU) focus on the practical treatment of concrete scientific tasks that are discussed during the lecture parts of the course. Maximum number of students: 12–20.

(3) Courses taken from other curricula are subject to the maximum number of students as specified in the respective curricula.

§ 6 Allocation of places in courses with a limited number of participants

In courses with a limited number of participants, the following criteria are applied to the allocation:

1. Attendance at the preliminary meeting (in person or by a deputy).
2. Students of the Master's Programme in Microbiology are given priority.
3. Number of semesters of registration for the Master's Programme in Microbiology, whereby students with a longer period of registration are given priority.
4. Drawing lots.

§ 7 Compulsory and elective modules

(1) The following compulsory modules covering altogether 37.5 ECTS-Credits are to be passed.

1.	**Compulsory Module: Systematics of Prokaryotes and Eukaryotes**	**h**	**ECTS-Credits**
a.	**VO Systematics of Microorganisms**	1	2
b.	**VO Taxonomy of Prokaryotes**	1	1.5
c.	**VO Taxonomy of Eukaryotes**	1	1.5
	Total	**3**	**5**

	Learning Outcomes: ad a.: Students are able to describe the principles underlying microbial systematics and can explain different species concepts and species definitions used in microbiology as well as their application to different taxa. They are also able to identify the appropriate codes that apply to specific taxa depending on the area of application. Students are able to consider ethical and legal aspects in the practice of microbial systematics, including aspects of promoting democratisation and openness, gender representation and equality and addressing neo-colonial practices in modern science, as well as considering regulatory aspects and their applications. ad b.: Students have a sound understanding of the diversity of prokaryotic microorganisms (bacteria, archaea) and viruses and know how they are classified. Students can describe the concepts of prokaryotic nomenclature and taxonomy and understand the application of molecular biological methods and bioinformatic tools that have enabled current, sequence-based taxonomic concepts. ad c.: Students are able to structure and compare the diversity of eukaryotic microorganisms ('eukaryotic tree of life'). They are able to describe basic concepts of eukaryotic nomenclature and taxonomy and have specialised knowledge of traditional (anatomy, morphology) and molecular biological (sequencing, bioinformatics) methods used to develop taxonomic concepts.
	Prerequisite/s: none

2.	**Compulsory Module: Physiology and Genetics of Microorganisms and Viruses**	**h**	**ECTS-Credits**
a.	**VO Physiology of Prokaryotes**	1	1.5
b.	**VO Physiology of Eukaryotes**	1	1.5
c.	**VO Genetics of Microorganisms**	2	3
d.	**VO Virology**	1	1.5
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students are able to describe the complex biological life processes of prokaryotes. Building on their specialised knowledge of chemoorganoheterotrophic physiology, they have in-depth knowledge of specific lifestyles such as lithotrophy, fermentation and anaerobic respiration. They are familiar with different mechanisms of signal transduction and metabolic regulation and can describe how prokaryotes can react to environmental stimuli. ad b.: Students are able to describe the complex physiological processes, properties and special features of microbial eukaryotes. They have in-depth knowledge of the special features of fungal physiology, such as the life form hyphal and mycelium, and of cellular growth. They can describe the processes of nutrient uptake, the specifics of metabolism in comparison to prokaryotes and the basic processes of primary and secondary metabolism of eukaryotic microorganisms and their regulation. ad c.: Students have in-depth knowledge of the basic genetic mechanisms and molecular genetics in prokaryotic and eukaryotic microorganisms. They are able to describe the most important tools and current methods of microbial genetic engineering and understand the mechanisms of regulation of gene expression and global control mechanisms in prokaryotic and eukaryotic microorganisms. ad d.: Students can describe different types of viruses that infect prokaryotic and eukaryotic microorganisms. They have specialised knowledge of the influence of viruses on the physiology and genetics of microorganisms.		
	Prerequisite/s: none		

3.	Compulsory Module: Scientific Principles	h	ECTS-Credits
a.	**VU Experimental Design and Statistics**	2	3.5
b.	**SE Scientific Writing & Communication in Science**	1	1.5
	Total	**3**	**5**
	Learning Outcomes: ad a.: Students can describe the basics of statistical analyses. They are able to independently plan and carry out microbiological tests and experiments, taking possible statistical significance into account. Students are able to critically interpret scientific work with regard to their experimental design and statistical significance. ad b.: Students can explain the basic structure of scientific research articles and are able to summarise scientific results from English-language publications. Students have in-depth knowledge of writing scientific manuscripts. They are able to present their research to both a scientific audience and the public and can discuss and reflect on progress and current problems of equal opportunities and gender equality in science.		
	Prerequisite/s: none		

4.	Compulsory Module: Instructions for Scientific Working	h	ECTS-Credits
	PS Instructions for Scientific Working	1	17.5
	Total	**1**	**17.5**
	Learning Outcomes: Students are able to formulate scientific questions for their Master's Thesis based on the current state of knowledge. They can develop hypotheses, test them using suitable methods and reflect on the results in scientific discourse. They are familiar with the standards of good scientific practice, understand the structure and creation process of a scientific paper and know the principles of good scientific writing style. They are also able to create and deliver academic presentations.		
	Prerequisite/s: none		

5.	Compulsory Module: Master’s Thesis Defense (Defensio)	h	ECTS-Credits
	Presentation and oral defence of the Master's Thesis before an examination board		2.5
	Total		**2.5**
	Learning Outcomes: Students are able to orally present and reflect on the theoretical and methodological positions as well as results of the Master's Thesis in the overall context of the Master's programme. They are able to present the main results of their Master's thesis and defend the thesis in a scientific discussion.		
	Prerequisite/s: positive evaluation of all other compulsory and elective modules as well as the Master’s Thesis		

(2) Elective modules covering 57.5 ECTS-Credits are to be passed:

1.	Elective Module: Sustainability, Material Cycles and Ecology of Microorganisms	h	ECTS-Credits
a.	**VO Importance of Prokaryotes in Natural Material Cycles**	1	2
b.	**VO Mechanisms of Microbial Degradation of Biopolymers**	1	1.5
c.	**VO Microorganisms for Greater Sustainability**	1	1.5
	Total	**3**	**5**
	Learning Outcomes: ad a.: Students can describe the ecological roles of prokaryotes in different habitats and the mechanisms by which they influence and are influenced by their environment. They are able to explain the importance of prokaryotes in biogeochemical cycles and to assess the effects of environmental changes on prokaryotic communities. ad b.: Students are able to describe the mechanisms of microbial degradation of biopolymers. They are familiar with the most important enzyme systems for breaking down complex organic macromolecules and have knowledge of their biotechnological applications and the biotransformation of renewable carbon sources. ad c.: Students can gain insights into the importance of microorganisms for global sustainability goals and are able to describe how global changes promote new pathogens and resistance to antimicrobial substances. They are able to categorise technological applications such as the use of single-cell proteins in food production or the development of sustainable systems, for example microbial biomaterials.		
	Prerequisite/s: none		

2.	Elective Module: Microbial Interactions at Cellular and Ecosystem Level	h	ECTS-Credits
a.	**VO Mechanisms and Role of Genetic Exchange in Microbial Communities**	1	2
b.	**VO Microbial Communication and Signal Transduction**	1	1.5
c.	**VO Fungal Interactions in the Ecosystem**	1	1.5
	Total	**3**	**5**
	Learning Outcomes: ad a.: Students can describe different mechanisms for the exchange of genetic information between microorganisms, such as horizontal gene transfer by viruses or extracellular vesicles, and understand the role of horizontal gene transfer for the development of microbial communities. ad b.: Students have in-depth knowledge of various microbial messenger substances and their effect on communication between microorganisms and with higher organisms. They can explain how these signals are recognised, processed and converted into a reaction by the cell and have knowledge of the structure and function of signalling pathways. ad c.: Students are familiar with various forms of interaction between fungi and plants and other microorganisms. They can describe the involved mechanisms of communication and the exchange of metabolites and understand the role of these interactions for the development of microbial communities and for the functions of the ecosystem. They are able to describe and compare different methods for analysing the interactions of these organisms.		
	Prerequisite/s: none		

3.	Elective Module: General Virology of Microorganisms	h	ECTS-Credits
a.	**SE General Virology of Microorganisms**	1	1.5
b.	**UE General Virology of Microorganisms**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can analyse, present and critically discuss current literature in the field of virology and describe the significance of viruses for microbial communities. ad b.: Students have in-depth practical skills in dealing with microbial viruses and are able to plan, carry out and analyse suitable experiments. Students can interpret the results independently and document and present them both orally and in writing.		
	Prerequisite/s: none		

4.	Elective Module: Extremophilic Microorganisms and Viruses	h	ECTS-Credits
a.	**SE Extremophilic Microorganisms and Viruses**	1	1.5
b.	**UE Extremophilic Microorganisms and Viruses**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students are able to analyse, present and critically discuss current literature in the field of theoretical foundations of microbial adaptation strategies in extreme habitats and describe the role of viruses in these habitats. ad b.: Students have in-depth practical skills in the application of current methods in dealing with extremophilic microorganisms and microbial viruses and are able to plan, carry out and analyse suitable experiments. In addition, students can interpret the results independently and document or present them both orally and in writing.		
	Prerequisite/s: none		

5.	Elective Module: Bacterial Physiology	h	ECTS-Credits
a.	**SE Bacterial Physiology**	1	1.5
b.	**UE Bacterial Physiology**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students have specialised knowledge of the physiological processes and adaptation mechanisms of bacteria. They are able to critically analyse scientific literature and interpret current research results. Students have the skills to discuss and present scientific topics in the field of bacterial physiology and can communicate physiological concepts clearly and precisely. ad b.: Students can independently plan, carry out and analyse complex experiments on bacterial physiology. Students are able to explain the basic principles of phototrophic, chemotrophic and lithotrophic microbial life and specific metabolic processes such as nitrogen fixation and the production of secondary metabolites on the basis of the experiments carried out.		
	Prerequisite/s: none		

6.	Elective Module: Physiology of Anaerobic Microorganisms	h	ECTS-Credits
a.	**AG Physiology of Anaerobic Microorganisms**	1	1.5
b.	**UE Physiology of Anaerobic Microorganisms**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students are able to explain and compare the theoretical principles and special features of anaerobic metabolic processes and their diversity and function in various natural and biotechnologically utilised habitats. ad b.: Students are able to cultivate anaerobic microorganisms (bacteria and archaea) and to plan, carry out and analyse complex experiments with them. Students develop an understanding of the diverse use of anaerobes in the biotechnological and environmental microbiological context and are able to scientifically prepare, present and discuss the knowledge gained.		
	Prerequisite/s: none		

7.	Elective Module: Fungi and Fungus-Like Protists	h	ECTS-Credits
a.	**AG Fungi and Fungus-Like Protists in Terrestrial, Limnic and Marine Habitats**	1	1.5
b.	**VU Diversity and Morphology of Fungi and Fungus-Like Protists**	2	3
c.	**UE Working Techniques Fungi and Fungus-Like**	2	3
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can explain their in-depth knowledge of the diversity of microbial eukaryotes (protists and fungi) and their diversity, ecology and physiology in different habitats. ad b.: Students can describe the importance and diversity of microbial eukaryotes in a variety of terrestrial, limnic and marine habitats and understand biological diversity as an essential component in the functioning of habitats. ad c.: Students are able to apply microscopic, culture and molecular biological techniques to isolate, characterise and identify different groups of microscopic eukaryotes such as moulds or fungal protists.		
	Prerequisite/s: none		

8.	Elective Module: Diversity and Function of Fungi in the Habitat	h	ECTS-Credits
a.	**AG Fungi in their Habitat**	1	1.5
b.	**SE Diversity and Function of Fungi in the Habitat**	1	1.5
c.	**EX Fungi in their Habitat**	3	4.5
	Total	**5**	**7.5**
	Learning Outcomes: ad a: Students can describe the importance of fungi in their respective habitats and their diverse interactions with plants, bacteria and animals. ad b.: Students are able to assess the diversity of fungi and understand their most important functions. They recognise fungi as central nodes in a networked environment. ad c.: Students can apply basic techniques for the identification of fungal fruiting bodies. They are able to recognise important characteristics of fungi and can correctly assess their taxonomic		

	value depending on the group of fungi. They master the basic microscopy techniques and staining methods for fungal identification and are able to use classical and digital identification keys. Based on the taxonomic classification of fungi and their substrate characteristics, students can draw conclusions about the function of these fungi and recognise typical interactions of fungi with other organisms in the common habitat.
	Prerequisite/s: none

9.	**Elective Module: Fungal Physiology**	**h**	**ECTS-Credits**
a.	**SE Fungal Physiology**	1	1.5
b.	**UE Fungal Physiology**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe basic principles of fungal metabolism and methods for its manipulation and can plan and carry out relevant experiments. ad b.: Students are able to cultivate filamentous fungi in various cultivation systems including bioreactors and can record, calculate and interpret quantitative parameters to describe growth processes and phases, physiological states and product formation (primary and secondary metabolites).		
	Prerequisite/s: none		

10.	**Elective Module: Mutualistic Interactions of Fungi**	**h**	**ECTS-Credits**
a.	**SE Mutualistic Interactions of Fungi**	1	1.5
b.	**UE Mutualistic Interactions of Fungi**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe the function and significance of mutualistic interactions of organisms using the example of mycorrhiza. ad b.: Students can plan field experiments, take samples, process samples and evaluate them scientifically. Students know how to select the appropriate sampling techniques and strategies depending on the type of mycorrhiza. Students are able to apply microscopy techniques and methods for documenting and identifying mycorrhizal systems. They can quantify mycorrhizal systems, identify symbiotic partners using classical and molecular methods, and statistically evaluate and describe the data.		
	Prerequisite/s: none		

11.	Elective Module: Microbial Genetic Engineering	h	ECTS-Credits
a.	**SE Microbial Genetic Engineering**	1	1.5
b.	**UE Microbial Genetic Engineering**	4	6
	Summe	**5**	**7.5**
	Learning Outcomes: ad a.: Students acquire in-depth background knowledge on the genetic manipulation of microorganisms using genetic engineering methods. They learn to analyse and interpret scientific literature and to present and discuss complex topics. ad b.: Students can apply methods for the genetic manipulation of bacteria and fungi. They are familiar with the safety measures that must be observed when producing and working with genetically modified microorganisms (GMOs) and can implement them. They have mastered the relevant molecular biology and microbiology techniques and are able to plan and carry out experiments and evaluate and interpret the results obtained.		
	Prerequisite/s: none		

12.	Elective Module: Resistance Development in Microorganisms	h	ECTS-Credits
a.	**SE Resistance Development in Microorganisms**	1	1.5
b.	**UE Resistance Development in Microorganisms**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe various mechanisms for the development of antibiotic resistance, such as point mutations, overexpression or duplication of genes, and explain the concept of screening mutant libraries to identify new therapies. ad b.: Students are able to investigate the effects of specific antibiotic resistances and their development in bacteria and fungi and can practically understand the results of site-directed mutagenesis and random mutagenesis in drug screening. Students are able to perform common antimicrobial activity tests and establish and explain the connection between the use of antibiotics and agrochemicals and the development of resistance to antimicrobial substances.		
	Prerequisite/s: none		

13.	Elective Module: Bioinformatics and Computational Genomics	h	ECTS-Credits
a.	**SE Advances in Bioinformatics and Computational Genomics**	1	1.5
b.	**UE Methods in Bioinformatics and Computational Genomics**	1	1.5
c.	**VU Genomic Data and Bioinformatic Analyses**	3	4.5
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe and discuss modern bioinformatics techniques. They can identify applications for various problems in computer-assisted genomics. ad b.: Students are able to execute, test and compare bioinformatic protocols and distinguish between analysis strategies based on their intended application, robustness and reproducibility. They can choose from a variety of methods for genomic analysis and visualisation and compare their strengths and limitations.		

	ad c.: Students can design a bioinformatic research strategy, including study design, data collection, bioinformatic and statistical analysis, and reporting. They can evaluate and justify decisions regarding research design and assess applications to genomic problems in a variety of models.
	Prerequisite/s: none

14.	**Elective Module: Soil Microbiology & Climate Change**	**h**	**ECTS-Credits**
a.	**AG Soil Microbiology & Climate Change**	1	1.5
b.	**UE Soil Microbiology & Climate Change**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe the diverse functions of microorganisms in soil and their importance in global material cycles. They are able to assess the effects of climate change on these processes. They understand the diverse interactions between soil microorganisms and the climate, including their role in the production of greenhouse gases, processes in thawing permafrost soils, and carbon storage and sequestration in soils. Students recognise soil as a valuable resource worthy of protection for all terrestrial ecosystems and as an important habitat for microorganisms. ad b.: Students can independently investigate current issues in soil microbiology using soil science, soil chemistry, micro- and molecular biology methods, and interpret and describe the results obtained in a statistically sound manner.		
	Prerequisite/s: none		

15.	**Elective Module: Omics-Technologies in Environmental Microbiology**	**h**	**ECTS-Credits**
a.	**SE Omics-Technologies in Environmental Microbiology**	1	1.5
b.	**UE Omics-Technologies in Environmental Microbiology**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can present a range of software tools and resources suitable for microbial omics research in the environment. Students have a comprehensive understanding of methods for characterising previously uncultivated microorganisms. ad b.: Students are able to use bioinformatic tools and applications to apply methods such as metagenomics, phylogenetics and statistics and analyse the structure and function of microbial communities. Students can apply their skills in interpreting large data sets from omics studies and are able to present their results using visualisation techniques.		
	Prerequisite/s: none		

16.	Elective Module: Phytopathology	h	ECTS-Credits
a.	**VU Phytopathology and Plant Protection**	2	3
b.	**UE Detection and Identification of Phytopathogens**	3	4.5
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe basic concepts of microbial phytopathology. They are able to isolate and identify plant pathogens from plant and environmental samples using appropriate methods and carry out corresponding experiments independently. Students can explain common methods of plant protection and control of pathogenic microorganisms. ad b.: Through practical experiments, students are able to establish the connections between disease phenotype, persistence, prevalence and abundance of phytopathogenic microorganisms, as well as their direct and indirect influence on the ecosystem and humans.This enables them to recognise complex relationships between humans, animals, plants and their shared environment and understand their role in relation to food security.		
	Prerequisite/s: none		

17.	Elective Module: Fungi in Anthropogenically Influenced Habitats	h	ECTS-Credits
a.	**AG Fungi in Anthropogenically Influenced Habitats**	1	1.5
b.	**UE Fungi in Anthropogenically Influenced Habitats**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can explain the role of mould fungi in various man-made and populated habitats (e.g. indoor spaces, the food industry, human medicine). They gain in-depth insight into the legal framework and standard-compliant experimental procedures and documentation based on selected examples. ad b.: Students can identify selected mould fungi, conduct experiments to monitor undesirable microorganisms, and learn methods for investigating microbial interactions between microorganisms in human-made habitats. Students can plan and conduct experiments based on norms, guidelines and standards, and evaluate, classify and document the results.		
	Prerequisite/s: none		

18.	Elective Module: Microbial Degradation of Plastics	h	ECTS-Credits
a.	**SE Microbial Degradation of Plastics**	1	1.5
b.	**UE Microbial Degradation of Plastics**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe the environmental problems caused by plastic waste and have a sound knowledge of microbial degradation of plastic and the methods used to quantify degradation. They are familiar with the preparation of samples for metagenomics and understand which bioinformatic tools are suitable for analysing microbial communities and characterising enzymes. ad b.: Students are able to assess microbial plastic degradation using physiological methods. They can apply bioinformatic methods to analyse microbial communities and can plan and independently conduct research on novel enzymes that have plastic degradation capabilities.		

	Prerequisite/s: none

19.	**Elective Module: Microbial Resource Management**	**h**	**ECTS-Credits**
a.	**VO Microbial Waste and Wastewater Treatment**	1	1.5
b.	**SE Trends in Microbial Resource Management**	1	1.5
c.	**UE Microbial Resource Management**	3	4.5
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can describe the importance of recycling biogenic waste materials, are familiar with the legal framework and ecological requirements, and have acquired in-depth, application-oriented knowledge of treatment methods, composting, biomethanisation and wastewater treatment. ad b.: Students can interactively address current topics in this field and learn important basics in presentation techniques and scientific communication. ad c.: Students can apply specialised knowledge in the field of microbial resource utilisation in the laboratory. They are able to describe specific biological degradation processes in waste and wastewater management and the microbial groups involved in detail and investigate them experimentally. Students can plan and carry out experiments and evaluate, interpret and communicate the results.		
	Prerequisite/s: none		

20.	**Elective Module: Molecular Physiology of Fungi relevant in Biotechnology**	**h**	**ECTS-Credits**
a.	**SE Molecular Physiology of Fungi relevant in Biotechnology**	1	1.5
b.	**UE Molecular Physiology of Fungi relevant in Biotechnology**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can demonstrate their in-depth knowledge of biotechnologically relevant fungal strains, their physiology and the underlying adaptations acquired in the course of strain improvement at the genetic and cell biology level. They can analyse relevant scientific literature and interpret, present and discuss its contents. ad b.: Students can apply selected techniques for the morphological, physiological, biochemical and molecular characterisation of biotechnologically relevant fungal strains. They can plan and carry out appropriate experiments and evaluate and interpret the results obtained.		
	Prerequisite/s: none		

21.	**Elective Module: Applied Microbiology – Career Fields in Research and Industry**	**h**	**ECTS-Credits**
a.	**SE Applied Microbiology – Career Fields in Research and Industry**	1	1
b.	**EX Applied Microbiology – Career Fields in Research and Industry**	4	4
	Total	**5**	**5**
	Learning Outcomes: ad a.: Students can explain and compare the specialised concepts and methods of microbiology in the context of industrial, regulatory and research-related applications. They are able to describe the most important fields of application and current developments in the areas of		

	environmental biotechnology, food biotechnology, environmental analysis, food and nutrition safety, and pharmaceutical biotechnology. ad b.: Students can demonstrate their in-depth practical insights into the working methods and processes of companies, authorities and research laboratories that use microorganisms in their applications. They can summarise the specific challenges and solutions that arise in various industries when using microorganisms.
	Prerequisite/s: none

22.	**Elective Module: Food Microbiology**	**h**	**ECTS-Credits**
a.	**SE Food Microbiology**	1	1.5
b.	**UE Food Microbiology**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students are able to demonstrate their in-depth knowledge of the controlled use of microorganisms in the food industry and understand the physiology of microorganisms used in food production and those that cause food spoilage. ad b.: Through practical experiments, students can demonstrate detailed knowledge of food production and preservation using fermentation and chemical processes. They are able to apply common (bio)chemical, micro- and molecular biological methods of quality assurance and can recognise food spoilage, provide analytical evidence of it, and assess and document it in accordance with the relevant guidelines.		
	Prerequisite/s: none		

23.	**Elective Module: Selected Chapters of Microbiology I: General Microbiology**	**h**	**ECTS-Credits**
	VU Selected Chapters of General Microbiology	2	2.5
	Total	**2**	**2.5**
	Learning Outcomes: Students can demonstrate their specialised knowledge in selected chapters of general microbiology and correctly and independently apply their specialised skills and abilities to current methods in this field.		
	Prerequisite/s: none		

24.	**Elective Module: Selected Chapters in Microbiology II: Applied Microbiology**	**h**	**ECTS-Credits**
	VU Selected Chapters of Applied Microbiology	3	5
	Total	**3**	**5**
	Learning Outcomes: Students can demonstrate their specialised knowledge in selected areas of applied microbiology, correctly and independently apply their specialised skills and abilities to current methods in this field and carry out and interpret corresponding experiments and analyses.		
	Prerequisite/s: none		

25.	Elective Module: Selected Chapters of Microbiology III: Environmental Microbiology	h	ECTS-Credits
a.	**SE Selected Chapters of Environmental Microbiology**	1	1.5
b.	**UE Selected Chapters of Environmental Microbiology**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students are able to analyse, present and critically discuss current literature from selected chapters of environmental microbiology. ad b.: Students can independently apply current methods in the field of environmental microbiology, plan, carry out and interpret corresponding experiments and analyses, and summarise their results in written form.		
	Prerequisite/s: none		

26.	Elective Module: Selected Chapters of Microbiology IV: Microbial Interactions	h	ECTS-Credits
a.	**VO Selected Chapters in Microbial Interactions**	1	1.5
b.	**EX Selected Chapters in Microbial Interactions**	4	6
	Total	**5**	**7.5**
	Learning Outcomes: ad a.: Students can demonstrate their specialised knowledge in selected areas of microbial interactions and describe the theoretical principles of various microbial interactions in different habitats. ad b.: Students are able to understand microbial interactions theoretically and describe them directly in their natural environment. They can take targeted environmental samples and analyse and interpret microbial interactions, summarising their findings in written form.		
	Prerequisite/s: none		

27.	Elective Module: Module from other Master's Programmes Offered at the Faculty of Biology	h	ECTS-Credits
	A module from another master's programme at the Faculty of Biology at the University of Innsbruck can be completed.		5
	Total		**5**
	Learning Outcomes: Students acquire additional and in-depth knowledge, skills and qualifications in another field of biology. They are able to establish connections to their own specialist knowledge and demonstrate a critical awareness of specialist topics at the interface between different areas. They are able to individualise and deepen their specialist profile by acquiring additional qualifications.		
	Prerequisites: The prerequisites specified by the respective curriculum are to be met.		

28.	Elective Module: Module from other Master's Programmes Offered at the Faculty of Biology	h	ECTS-Credits
	A module from another master's programme at the Faculty of Biology at the University of Innsbruck can be completed.		7.5
	Total		**7.5**
	Learning Outcomes: Students acquire additional and in-depth knowledge, skills and qualifications in another field of biology. They are able to establish connections to their own specialist knowledge and demonstrate a critical awareness of specialist topics at the interface between different areas. They are able to individualise and deepen their specialist profile by acquiring additional qualifications.		
	Prerequisites: The prerequisites specified by the respective curriculum are to be met.		

29.	Elective Module: Interdisciplinary Skills	h	ECTS-Credits
	Provided that places are available, courses covering 5 ECTS-Credits may be freely chosen from the curricula of other master's programmes offered at the University of Innsbruck. It is recommended to select courses from the field of gender competence promotion.		5
	Total		**5**
	Learning Outcomes: Students acquire additional and in-depth knowledge, skills and qualifications. They are able to relate this knowledge to their own subject area and demonstrate critical awareness of specialist topics at the interface between different fields. They are able to individualise and deepen their subject profile by acquiring additional qualifications.		
	Prerequisites: The prerequisites specified by the respective curriculum are to be met.		

30.	Elective Module: Interdisciplinary Skills	h	ECTS-Credits
	Provided that places are available, courses covering 2.5 ECTS-Credits may be freely chosen from the curricula of other master's programmes offered at the University of Innsbruck. It is recommended to select courses from the field of gender competence promotion.		2.5
	Total		**2.5**
	Learning Outcomes: Students acquire additional and in-depth knowledge, skills and qualifications. They are able to relate this knowledge to their own subject area and demonstrate critical awareness of specialist topics at the interface between different fields. They are able to individualise and deepen their subject profile by acquiring additional qualifications.		
	Prerequisites: The prerequisites specified by the respective curriculum are to be met.		

§ 8 Master's Thesis

(1) In the Master's Programme in Microbiology, a Master's Thesis covering 25 ECTS-Credits must be written. The Master's Thesis is a scientific paper that serves as proof of the ability to work independently on a scientific topic in a manner that is flawless in terms of content and methodology.

(2) All topics that contribute to knowledge building in microbiological research are eligible for the Master's Thesis.

(3) Students are entitled to write their Master's Thesis in another language if their supervisor agrees to it.

(4) Several students may work together on a topic if the performance of each individual student can be assessed separately.

(5) The completed Master's Thesis must be submitted to the Director of Studies in electronic form. It must be accompanied by an affidavit confirming that the rules of good scientific practice have been followed. At the request of the assessor, the Master's Thesis must also be submitted in written form in addition to the electronic form.

§ 9 Examination regulations

(1) A module, with the exception of the Module Master's Thesis Defense (Defensio), is completed by the positive evaluation of its courses.

(2) The performance in courses of the modules is assessed by course examinations. Course examinations serve to proof the knowledge and skills imparted by a single course whereby

1. in the case of courses without continuous performance evaluation, the evaluation is based on a single exam at the end of the course.
2. in the case of courses with continuous performance evaluation the evaluation is based on at least two written, oral and/or practical contributions of the participants.

(3) The course instructor has to define and announce the examination method (written and/or oral, exam paper) and the evaluation criteria before the start of the semester.

(4) The performance of Compulsory Module 5 (Master's Thesis Defense – Defensio) which completes the study programme has the form of an oral exam in front of an examination board consisting of three persons.

(5) Modules and courses taken from other study programmes are subject to the examination regulations of the curriculum they have been taken from.

§ 10 Academic degree

Graduates of the Master's Programme in Microbiology are awarded the academic degree "Master of Science", abbreviated "MSc".

§ 11 Coming into force

This curriculum comes into force on 1 October 2025.

§ 12 Transitional provisions

(1) This curriculum applies to all students who start the study programme from the 2025/26 winter semester onwards.

(2) Regular degree students who started the Master's Programme in Microbiology, published in the University of Innsbruck Bulletin of 29 April 2008, Issue 37, No. 266, lasts amended as announced on 28 June 2019, Issue 65, No. 574 at the University of Innsbruck before 1 October 2025, are entitled to finish this study programme within a maximum of six semesters from this point in time.

(3) If the Master's Programme in Microbiology is not finished in time pursuant to para. 2, the students will be subject to the curriculum for the Master's Programme in Microbiology (new release 2025).

(4) The students of the Master's Programme in Microbiology (2019) are entitled to subject to the curriculum for the Master's Programme in Microbiology (2025) on a voluntary basis any time.