Bachelor programme Biological Sciences

List of courses offered in English if international students are enrolled

The duration of each course is 6 weeks, either in the 1st or 2nd half of the semester.

Summer semester (middle of April until middle of July)

- BSc-Biow-12A - **Plant Ecology**, 1st half of semester (starting in 2023), 6 ECTS credits
- BSc-Biow-12B - **Animal Physiology**, 1st half of semester, 6 ECTS credits
- BSc-Biow-13B - **Neurobiology I**, 2nd half of semester, 6 ECTS credits
- BSc-Biow-13C - **Molecular Plant Physiology**, 2nd half of semester, 6 ECTS credits

Winter semester (middle of October until middle of February of the following year)

- BSc-Biow-14B - **Cell Biology**, 1st half of semester, 6 ECTS credits
- BSc-Biow-15A - **Evolutionary Biology and Diversity of Animals**, 2nd half of semester, 6 ECTS credits
- BSc-Biow-15B - **Neurobiology II**, 2nd half of semester, 6 ECTS credits

Course descriptions

Course descriptions

BSc-Biow-12A - **Plant Ecology**, 1st half of semester, starting in 2023, 6 ECTS credits

BSc-Biow-12A	**Plant Ecology**	**Elective module**	**6 CP (total) = 180 h**		**4 SWS**
			Contact study 4 SWS / 60 h	**Self-study 120 h**	

Contents

The practical course teaches basic methods of plant ecological research using selected native ecosystems as examples. This practical approach serves to deepen the theoretical knowledge acquired in the lecture "Ecology". In addition, characteristic species of the respective ecosystems as well as important indicator species for certain site characteristics are to be learned. Knowledge about the effects of abiotic factors on plant occurrence and performance will be imparted.

Educational Objectives / Competences

Students will master key ecological study methods and be familiar with the most important native ecosystems in terms of area. They will recognize selected ecologically significant species (character species of ecosystems, indicator species for specific site characteristics). They will understand the effect of abiotic factors on plant occurrence and performance.

Requirements for Participation

Requirement for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc-Biow-6a and BSc-Biow-6b (Diversity of Organisms) and BSc-Biow-9 (Ecology and Evolutionary Biology). Exceptions for students on courses other than BSc Biosciences require approval on a case-by-case basis by the module leader prior to allocation of places.

Recommended Requirements

Successful completion of the module BSc-Biow-11 (Plant Physiology and Microbiology).

Special notes

In the case of field work, travel costs may be incurred by the internship participants. Since part of the internship will be conducted in the field, participants are advised to get immunized against TBE in time by vaccination.

Dates and Module Frequency	Once a year in the summer semester.
Duration	1/2 semester
Module responsible	Prof. Dr. J.F. Niek Scheepens
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, seminar
Module Completion Test	none
Module Completion Test consists of:	

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Plant Ecology	P	3	5				X		
Plant Ecology	S	1	1				X		
Module examination									
Sum		4	6						

BSc-Biow-12B - **Animal Physiology**, 1st half of semester, 6 ECTS credits

BSc-Biow-12B	**Animal Physiology**	**Elective module**	**6 CP (total) = 180 h**		**4 SWS**
			Contact study 4 SWS / 60 h	**Self-study 120 h**	

Contents

The practical course provides insights into experimental investigation methods for comparative physiology in humans and animals (e.g. energy balance, excretion, blood, circulation, respiration, musculature and nutrition)

Educational Objectives / Competences

Students will master important physiological investigation methods in the laboratory. They are able to evaluate evolutionary adaptation strategies and their individual development and know the importance of abiotic factors on reaction mechanisms and their selective effect on competition.

Requirements for Participation

Requirement for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc-Biow-6a and BSc-Biow-6b (Diversity of Organisms) and BSc-Biow-7 (Biochemistry and Animal Physiology).

Recommended Requirements

Special notes

Dates and Module Frequency	Once a year in the summer semester.
Duration	1/2 semester
Module responsible	Prof. Dr. Sven Klimpel
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, seminar
Module Completion Test	none

Module Completion Test consists of:

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Animal Physiology	P	3	5				X		
Animal Physiology	S	1	1				X		
Module examination									
Sum		4	6						

BSc-Biow-13B - **Neurobiology I**, 2nd half of semester, 6 ECTS credits

BSc-Biow-13B	**Neurobiology**	**Elective module**	**6 CP (total) = 180 h**		**4 SWS**
			Contact study 4 SWS / 60 h	**Self-study 120 h**	

Contents

Teaching and learning of basic methods of neurobiology, including histological examinations of nervous tissue and of sensory organs, basic electrophysiological experimental setups, psychophysical approaches to examination, simulation of neuronal activity.

Educational Objectives / Competences

Students will learn basic neurobiological working methods to understand experimental approaches in neurobiology and to prepare for an appropriate bachelor thesis.

Requirements for Participation

Requirement for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc-Biow-6a and BSc-Biow-6b (Diversity of Organisms) and BSc-Biow-10 (Neurobiology, Cell and Developmental Biology).

Recommended Requirements

Special notes

Dates and Module Frequency	Once a year in the summer semester.
Duration	1/2 semester
Module responsible	Prof. Dr. Bernd Grünewald, PD Dr. Bernhard Gaese
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, seminar
Module Completion Test	none
Module Completion Test consists of:	

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Neurobiology I	P	3	5				X		
Neurobiology I	S	1	1				X		
Module examination									
Sum		4	6						

BSc-Biow-13C - **Molecular Plant Physiology**, 2nd half of semester6 ECTS credits

BSc-Biow-13C	Molecular Plant Physiology	Elective module	6 CP (total) = 180 h		4 SWS
			Contact study 4 SWS / 60 h	Self-study 120 h	

Contents

Teaching and learning of basic methods in molecular plant physiology and developmental physiology, including basic methods of plant biochemistry and methods to examine metabolic regulation.

Educational Objectives / Competences

Students possess practical skills in basic laboratory techniques in plant physiology, biochemistry and biophysics. In addition, students have the ability to quantitatively analyse and to critically evaluate experimental data. They are trained in experimental concepts as a prerequisite for a corresponding bachelor thesis.

Requirements for Participation

Prerequisite for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc- Biow-6a and BSc-Biow-6b (Diversity of Organisms) and the successful completion of the module BSc-Biow-11 (Plant Physiology and Microbiology).

Recommended Requirements

Successful completion of modules BSc-Biow-2a and -2b (General and Inorganic Chemistry), BSc-Biow-3a and -3b ("Organic Chemistry for Natural Scientists and Teachers L2") and BSc-Biow-5 (Statistics).

Special notes

Dates and Module Frequency	Once a year in the summer semester.
Duration	1/2 semester
Module responsible	Prof. Dr. Claudia Büchel
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, seminar
Module Completion Test	none
Module Completion Test consists of:	

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Molecular Plant Physiology	P	3	5				X		
Molecular Plant Physiology	S	1	1				X		
Module examination									
Sum		4	6						

BSc-Biow-14B **- Cell Biology**, 1st half of semester, 6 ECTS credits

BSc-Biow-14B	**Cell Biology**	**Elective module**	**6 CP (total) = 180 h**		**4 SWS**
			Contact study 4 SWS / 60 h	**Self-study 120 h**	

Contents

In the practical course, typical cell and developmental biology experiments are carried out to better understand the organization and function of eukaryotic cells in its normal and disease state. This includes, for example, the transformation of plant cells with fluorescent reporter constructs, induction of apoptosis in cell culture, challenging early development in zebrafish embryo, investigating cellular transport of receptors linked to Alzheimer's disease using *C. elegans* mutant lines.

Educational Objectives / Competences

The students will identify and analyze different cell types, tissues and organs, as well as the internal organization of cells in different eukaryotic model systems. They will better understand how cells function in a multicellular organism, with a focus on signal transduction, cell identity, cell death, and intracellular transport. The participants will learn to handle different multicellular model systems as well as to apply various staining and fluorescence microscopy techniques.

Requirements for Participation

Requirement for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc-Biow-6a and BSc-Biow-6b (Diversity of Organisms) and BSc-Biow-10 (Neurobiology, Cell and Developmental Biology).

Recommended Requirements

Successful completion of the module BSc-Biow-7 (Biochemistry and Animal Physiology).

Special notes

Dates and Module Frequency	Once a year in the winter semester.
Duration	1/2 semester
Module responsible	Prof. Dr. Virginie Lecaudey
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, seminar
Module Completion Test	none
Module Completion Test consists of:	

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Cell biology	P	3	5					X	
Cell biology	S	1	1					X	
Module examination									
Sum		4	6						

BSc-Biow-15A - **Evolutionary Biology and Diversity of Animals**, 2nd half of semester, 6 ECTS credits

BSc-Biow-15A	**Evolutionary Biology and Diversity of Animals**	**Elective module**	**6 CP (total) = 180 h**		**4 SWS**
			Contact study 4 SWS / 60 h	**Self-study 120 h**	

Contents

In this module different contents of evolutionary biology and biodiversity of animal organisms are presented exemplarily. On the one hand, this is done through laboratory practical courses (possibly also in the field), which include a demonstration and explanation part, but also practical components to be carried out independently. On the other hand, exercises, statistical calculations and drawing-graphical implementations are also trained. The students receive basic theoretical introductions to the respective topic of the day and are stimulated in discussion or seminar rounds to penetrate the content of the material. The content and the model organisms come predominantly from the research areas of the participating lecturers (vertebrates, invertebrates, data sets from research projects, others), whereby the students at the same time gain an insight into their respective research field and the project-specific analysis approaches.

Educational Objectives / Competences

The students are able to realistically assess the biological diversity in the animal kingdom, how it is represented within species and between species. They will be able to independently formulate (within the context of the examples covered) approaches to analysis in evolutionary biology and evaluate results. They will be familiar with selected laboratory and computational techniques used for analyses of evolutionary and behavioral biology, evolutionary ecology and phylogeny, and biodiversity, communities, and populations..

Requirements for Participation

Requirement for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc-Biow-6a and BSc-Biow-6b (Diversity of Organisms) and BSc-Biow-9 (Ecology and Evolutionary Biology)

Recommended Requirements

Special notes

For some of the module days, appropriate dissecting equipment should be kept on hand. Some of the content involves work and analysis on PCs. In case of field work, minor travel costs may be incurred (no overnight stays). For organizational reasons, the module may be offered as a block course in the intermediate semester.

Dates and Module Frequency	Once a year in the winter semester.
Duration	1/2 semester, if necessary as a compact module in the intermediate semester
Module responsible	Prof. Dr. Henner Hollert
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, exercises, seminar
Module Completion Test	none

Module Completion Test consists of:

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Evolution and Diversity of Animals	P	3	5					X	
Evolution and Diversity of Animals	S	1	1					X	
Module examination									
Sum		4	6						

BSc-Biow-15B - **Neurobiology II**, 2nd half of semester, 6 ECTS credits

BSc-Biow-15B	**Neurobiology II**	**Elective module**	**6 CP (total) = 180 h**		**4 SWS**
			Contact study 4 SWS / 60 h	**Self-study 120 h**	

Contents

Basic methods of neurobiology are applied practically. The main focus is on cellular and molecular neurobiology.

Educational Objectives / Competences

The students acquire an overview of the molecular functions of nerve cells and their interactions by using cell biological and molecular biological examination techniques including neurons in culture, 2D and 3D analysis of mouse brain.

Requirements for Participation

Requirement for participation is the successful completion of the modules BSc-Biow-1 (Structure and Function of Organisms), BSc-Biow-6a and BSc-Biow-6b (Diversity of Organisms) and BSc-Biow-10 (Neurobiology, Cell and Developmental Biology).

Recommended Requirements

Special notes

Dates and Module Frequency	Once a year in the winter semester.
Duration	1/2 semester
Module responsible	Prof. Dr. Amparo Acker-Palmer
Proof of Study	
Proof of participation	Active participation in the practical course
Course Assessment	Protocols
Forms of Teaching	Practical course, seminar
Module Completion Test	none
Module Completion Test consists of:	

	LV-Form	SWS	CP	Semester					
				1	2	3	4	5	6
Neurobiology II	P	3	5					X	
Neurobiology II	S	1	1					X	
Module examination									
Sum		4	6						