



UNIVERSITY OF
HOHENHEIM



Faculty of Natural Sciences

natur.uni-hohenheim.de/en

contents

04 THE UNIVERSITY OF HOHENHEIM

06 THE FACULTY OF NATURAL SCIENCES

08 ACADEMIC STRUCTURE

10 BIOLOGY

12 MASTER'S PROGRAM IN BIOLOGY

14 MASTER'S PROGRAM IN AGRICULTURAL BIOLOGY

16 TEACHER PROGRAM MASTER OF EDUCATION IN BIOLOGY

18 NUTRITIONAL SCIENCE

20 MASTER'S PROGRAM IN MOLECULAR NUTRITION

22 MASTER'S PROGRAM IN CLINICAL NUTRITION

24 FOOD SCIENCE AND BIOTECHNOLOGY

26 MASTER'S PROGRAM IN FOOD BIOTECHNOLOGY

28 MASTER'S PROGRAM IN FOOD SCIENCE AND ENGINEERING

30 MASTER'S PROGRAM IN FOOD CHEMISTRY

32 MASTER'S PROGRAM IN FOOD SYSTEMS

34 FUNDAMENTAL SUBJECTS

36 MASTER'S PROGRAM IN EARTH AND CLIMATE SYSTEM SCIENCE

38 MASTER'S PROGRAM IN BIOECONOMY

40 DOCTORAL DEGREE PROGRAM

42 BACHELOR PROGRAMS



Dear reader,

Welcome to the Faculty of Natural Sciences at the University of Hohenheim!

In this brochure, we would like to give you a vivid overview of our activities in scientific research and academic education, to convey the atmosphere of scientific excellence and to document the extensive research activities.

The scientific profile of our Faculty is characterized equally by basic research and application-oriented research mainly focusing on various aspects of the life sciences; it includes biology, chemistry, physics, nutritional and food sciences, alongside with the scientific discipline of mathematics. This broad spectrum of expertise and our excellent research staff, which ranges from early-career researchers to internationally renowned professors, enables the developing of novel interdisciplinary approaches in ambitious and productive programs both in teaching and research. These activities are supported by a team of competent technicians and superb facilities which not only lead to outstanding results but also continue to attract new talents. Thus, the Faculty provides an inspiring and dynamic environment for learning and research.

The favorable scientific atmosphere for studying, research and teaching benefits both from the intense mutual interaction with our neighbouring faculties and from partnerships with national and international institutions at the forefront of research. The interdisciplinary nature of scientific activities is reflected in both a targeted knowledge exchange with regional and international businesses and the broad range of courses which enables students to choose from the repertoire according to their skills and interests. 'Learning through research' programs allow students to be a close part of scientific enterprises exploring timely scientific topics with national and international implications. In all our efforts, we are strongly committed to achieve excellence in education, research and innovation.

I hope you enjoy reading about our work and may be inspired to join our Faculty.

A handwritten signature in blue ink that reads "Uwe Beifuß". The signature is written in a cursive, slightly slanted style.

Professor Dr. Uwe Beifuß
Dean

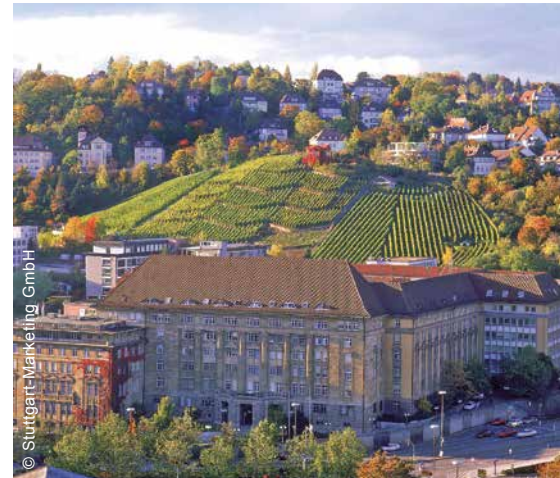
The University of Hohenheim



INTERNATIONALITY, INNOVATION AND SUSTAINABILITY RESEARCH

Just on the edge of Stuttgart, amidst sprawling parklands and magnificent botanical gardens, lies the campus of the University of Hohenheim. A baroque palace at its centre, our beautiful campus buzzes with academic fervor. With a unique and interdisciplinary profile in the fields of the natural sciences, the agricultural sciences, and business, economics and social sciences, the University of Hohenheim is one of the leading institutions in national and international rankings. Our location in the prosperous economic region of Stuttgart – home to national or world headquarters of global players such as IBM, Daimler, Porsche, Bosch and Hewlett-Packard – as well as collaborations with international industry keep the University of Hohenheim keenly attuned to the demands of a global economy.

Strong individual research conducted in each department and each faculty is counterpointed by transdisciplinary research projects, spanning departments as well as faculties. Several trans-facultative research centers attract researchers from all over the world and provide room for new and innovative approaches to a wide range of contemporary social issues such as healthy and affordable nutrition, environmental protection and gender equality. Firmly established in globe-spanning networks, such as the Euroleague for Life Sciences (ELLS) or the Strategic Network Bio-based Economy (BECY), Hohenheim provides staff and students with excellent opportunities for research and academic exchange. Facilitating collaborative work across University and national borders enables us to make important practical contributions to sustainable economic, agricultural and social developments on a local and a global level.



TEACHING

Teaching at Hohenheim is closely connected to and based on modern and up-to-date research. This, along with a strong orientation towards the global academic and economic fields, makes our graduates competitive in the international market. Modern infrastructure and a specialized range of administrative services support researchers and students alike and contribute to their success. The University's innovative teaching methods, its family and gender-based programs, excellent work-life balance and further education courses make it an especially attractive place to work, study and live.

STUTT GART

The University of Hohenheim provides staff and students with an excellent environment for research and studies. However, its campus as well as its surrounding area also have much else to offer. As one of the leading cultural capitals of Germany, Stuttgart shines with its many big and small venues, offering a lively and vibrant cultural scene. The Stuttgart State Theatre, home to opera, ballet and theatre, is renowned and praised around the world for its modern and innovative productions. A green metropolis, picturesque forests, gardens, parks and vineyards surround Stuttgart and often extend far into the city.

The Faculty of Natural Sciences

The study of the natural sciences at the University of Hohenheim focuses on the disciplines of biology, nutritional science and food science. The basic natural science subjects of chemistry, physics and mathematics complete the academic landscape of the Faculty of Natural Sciences. The Faculty's primary fields of research are focused on central issues of the life and health sciences, such as "Biological Signals" and "Healthy and Safe Nutrition", while also being firmly integrated in the University-wide research focus "Biobased Economy".

RESEARCH
— AND —
STUDY



HISTORY

Research and training in the natural sciences has been part of the academic landscape at the University of Hohenheim since the University was founded as an agricultural academy in 1818. However, as a mere supplement to the agricultural sciences, the natural sciences were regarded as an auxiliary science at the time. While the position of the natural sciences improved slowly with the establishment of several new disciplines, it was a speech given by German chemist Justus von Liebig in 1861 that started the emancipation of the natural sciences at German agricultural academies, including Hohenheim. Liebig claimed that proper natural scientific research

and training was required for the agricultural academies to remain academically relevant in the face of their isolation from scientific progress due to their emphasis on agricultural practices. Only as an applied natural science could the agricultural sciences achieve any progress. An opinion not well received by the agricultural academies Liebig addressed.

Yet, with almost all agricultural academies closing or becoming universities at the turn of the century, Hohenheim was forced to react and expanded the scope and status of the natural sciences.



Owing to the growing demands towards agricultural production in the early twentieth century, the natural sciences gained in importance and an increasing number of independent disciplines were introduced.

By 1964 the natural sciences and most prominently the discipline of biology had evolved into fully autonomous disciplines and the Faculty of Natural Sciences was founded to accommodate the ever-expanding natural scientific and biological research. While ties to the agricultural sciences remained, the study of biology moved to the centre of life science research at Hohenheim.

In 1967 the Faculty further expanded its academic repertoire by establishing institutes and introducing study programs in food technology and nutritional science as one of the pioneers of these disciplines in Germany. Already immersed in the scientific exploration of agriculture and having its roots in the provision of edible agricultural produce, these disciplines complemented Hohenheim's academic landscape.

THE MODERN FACULTY OF NATURAL SCIENCES

Due to a well-balanced mix of basic and applied research we are ideally positioned to compete nationally and internationally with regards to the quality and direction of our teaching. We contribute significantly to the success and the diversity of the current research landscape at the University of Hohenheim through cooperations within our Faculty and across faculty borders in scientific centers, interdisciplinary study programs and research projects, as well as international research and exchange networks.

Apart from the necessary diversification of research and the ensuing specializations within our departments, we are continuously working towards developing and advancing common research goals. These shape the profile of the Faculty of Natural Sciences in crucial ways, create synergies and firmly position us as a strong competitor within the national and international scientific community. New professors and their departments have further expanded the Faculty's research portfolio in recent years and established new links between diverse sub-disciplines. This has enabled us to create coherent scientific frameworks.

The academic setup and broad spectrum of expertise encountered at our Faculty is unique in Germany and opens up exceedingly interesting prospects for students and researchers alike. The interplay of diversification and common trajectories provides our students with the opportunity to obtain diversified expert knowledge in specific fields while being able to efficiently transfer this knowledge to adjoining areas of research. Transdisciplinary critical thinking skills are acquired through the closely connected research landscape of the natural sciences in Hohenheim and ties to the fields of medicine and the agricultural as well as economic and social sciences. Scientific curiosity that reaches beyond specialization and a fascination for transdisciplinary projects is a motor for innovation as much as it is a display of the commitment of our academic staff to remain at the top of their respective fields.

Academic Structure

Institutes of the Faculty of Natural Sciences

INSTITUTE OF BIOLOGY (190)

The Institute 190 focuses on the laws of life of microorganisms, plants and animals. In research and teaching, the institute covers the entire field of biology, from the molecular basis of life to the function of ecosystems. Institute 190 is the largest institute in the Faculty of Natural Sciences. One focus of research is biological interactions, such as the interactions of organisms with their animate and inanimate environment, but also the interactions between organs or cells, all of which are ultimately mediated by biomolecular interactions. With the establishment of the Center of Excellence for Biodiversity and integrative Taxonomy (KomBioTa), a further focus was placed on biodiversity research.

INSTITUTE OF CLINICAL NUTRITION (180)

The research and teaching of the Institute 180 are dedicated to nutritional medicine, prevention and gender research, as well as immunology, dietetics and nutritional psychology. Institute 180 aims to expand nutritional science courses and research in the fields of medicine, immunology, dietetics and nutritional behavior, and to expand the bridge between basic and practical research. Analytical, molecular biology and medical content is taught with the aim of providing a sound scientific education.

INSTITUTE OF NUTRITIONAL SCIENCE (140)

The Institute 140 consists of the four departments of Nutritional Science (140a), Food Biofunctionality (140b), Nutritional Biochemistry (140c), and Microbiome and Applied Bioinformatics (140d). The teaching and research focus of the Institute 140 therefore includes the areas of general nutritional science and the biofunctionality and bioavailability of micronutrients as well as secondary plant compounds, the biochemical, pharmacological and physiological processes involved, including aspects of the investigation of the composition, function and modulation of the microbiome. The aim is to provide students with relevant basic knowledge and established laboratory methods as well as current research topics and state-of-the-art techniques.

INSTITUTE OF FOOD SCIENCE AND BIOTECHNOLOGY (150)

Research at the Institute 150 is dedicated to the processing of plant and animal raw materials into edible, high-quality and healthy foods, food supplements, and functional active and valuable substances. Teaching covers scientific and engineering aspects that illuminate the food value chain as a whole and the complex interactions between ingredients, processes, and food functionality. Knowledge of the scientific methodology for the development of technical processes for the manufacture of products for the food and health industries and a high level of scientific and process engineering competence, which focuses on the constant interaction between research and teaching, are taught.

INSTITUTE OF FOOD CHEMISTRY (170)

Research and teaching at the Institute 170 are concerned with the properties and transformations of foodstuffs and their constituents. In addition to foodstuffs, the focus is also on feedstuffs, cosmetic products and other consumer goods such as packaging materials, food and cooking utensils, cleaning and washing agents, clothing and laundry, toys, as well as tobacco and tobacco products. Students receive training as food chemists, who can work, for example, in food, cosmetics, luxury food and consumer goods inspection, development and research, as well as in environmental protection.

INSTITUTE OF PHYSICS AND METEOROLOGY (120)

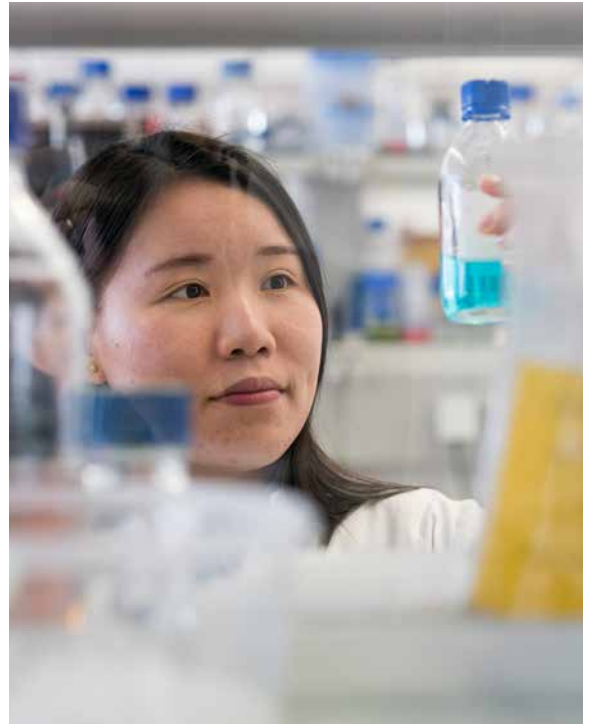
The research focus of the Institute 120 is the investigation of the Earth system through the generation of novel, synergetic data sets and the application of Earth system models with optimized process representations, parameterizations and higher spatial resolution. To this end, the Institute 120 initiated the Land Atmosphere Feedback Observatory (LAFO) facility at the University of Hohenheim and develops and operates worldwide unique laser remote sensing systems to measure profiles of temperature, humidity, wind, aerosol particles and clouds. In particular, land-atmosphere feedback processes are investigated and modern data assimilation techniques are applied, which will lead to more accurate prediction of extreme events (droughts, precipitation).

INSTITUTE OF APPLIED MATHEMATICS AND STATISTICS (110)

The Institute 110 is dedicated to the application and development of mathematical techniques to models and problems mainly from the life sciences. The focus is on the numerical simulation of biological systems based on differential equations as well as the evaluation of experimental data using methods of statistics and machine learning. The Institute 110 thus also provides the theoretical basis for research and teaching in all empirical disciplines and natural sciences, including biology, chemistry and physics.

INSTITUTE OF CHEMISTRY (130)

In the field of "Bioinorganic Chemistry and Chemical Evolution", the research focus of the Institute 130 is on (a) abiotic organic reactions on (young) terrestrial planets, especially under the influence of minerals, (b) chemical biosignatures in the search for extraterrestrial life, and (c) chemical evolution on primordial volcanic islands. In the area of "Bioorganic Chemistry", research is conducted on (a) the development of sustainable synthetic methods for the efficient assembly of heterocycles, (b) oxidative transformations (e.g., phenol couplings and laccase-catalyzed domino processes), and (c) the isolation and structural elucidation of natural products; a particular interest is (d) the synthesis and development of pressure and temperature sensors. The main focus in teaching at the institute is on basic knowledge in the fields of inorganic and organic chemistry.



Biology

PROFILE

Biological sciences at Hohenheim have an international reputation in research topics which range from molecules, cells and whole organisms to populations and the environment. Most of the scientific activities are subsumed under the heading “Dynamic processes in complex biological systems”. The results of ongoing research projects exploring fundamental biological phenomena and processes not only contribute to a better understanding of living organisms but can also provide new insights into the causes of disease and the ability of cells and organisms to repair and regenerate themselves.

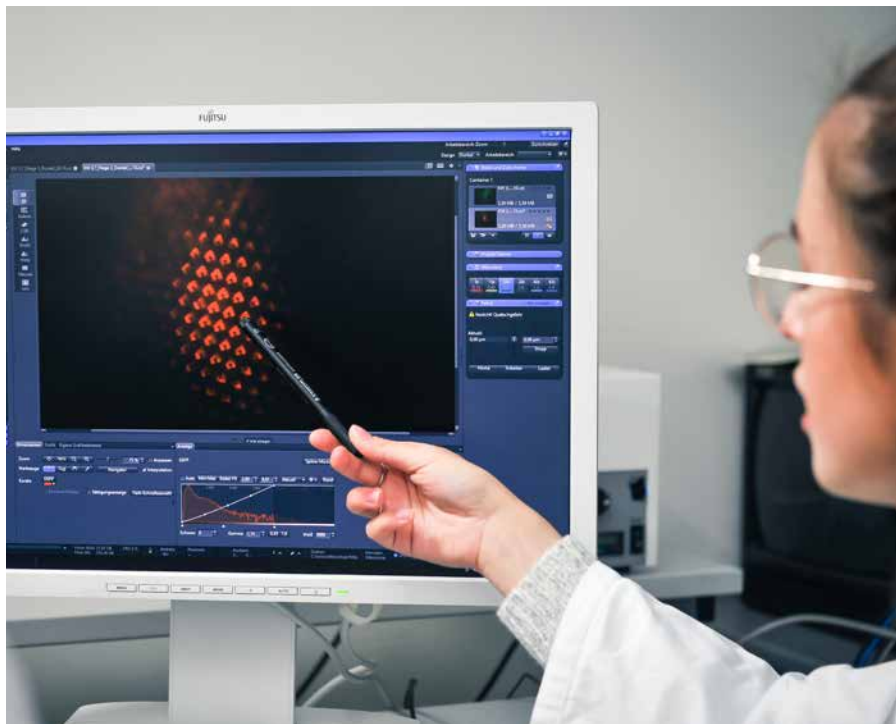
RESEARCH

Research activities are performed by several thematically arranged research groups which are anchored in several departments covering the entire field of biology, from the molecular basis of life to the function of ecosystems.

There are intense cooperations and multiple collaborations not only with the neighboring University of Stuttgart, the University of Tübingen and the State Museum of Natural History Stuttgart, but also with numerous national and international research institutions.

Within the University most of the disciplines in biological sciences have strong connections to other disciplines, most notably to food science and nutritional sciences, but also to the agricultural and economic sciences. The biological sciences at Hohenheim are therefore an integral part of research into a “biobased economy”, the scientific priority area of the University of Hohenheim.

The spectrum and quality of research and teaching in biological sciences is based on the strong commitment of a great number of tenured professors and their research groups, all interconnected with national and international research networks.



RESEARCH FOCUS

One focus of research is biological interactions, such as the interactions of organisms with their animate and inanimate environment, but also the interactions between organs or cells, all of which are ultimately mediated by biomolecular interactions. Under the topic “Dynamic processes in complex biological systems”, our scientific activities are directed towards fundamental questions of the life sciences, such as: How does a system as complex as a cell function? How does the genome code for the functional complexity? How do different cell types collaborate and become organized into functional organs? How do they cooperate to generate an organism with adaptive behavior? How do organisms communicate with each other and with their local environment? In the search for answers to these fundamental questions, our researchers use highly sophisticated experimental approaches for their investigations, with up-to-date analytical technology and a variety of suitable model organisms. Modern facilities for housing plants and animals

as well as the latest analytic equipment and research devices, which are on hand in a core facility, provide an excellent platform for research projects approaching timely scientific questions.

Our research activities include:

- Biogenesis of membrane proteins
- Biomolecular processes underlying complex developmental processes
- Molecular mechanisms of sensory systems
- Regulation of characteristic behavioral processes
- Regulation of ecosystems
- Biomolecular processes underlying pathological processes
- Modelling of complex biological systems
- Principles of plant growth



With the establishment of the Center of Excellence for Biodiversity and integrative Taxonomy (KomBioTa), a further focus was placed on biodiversity research.



”

Acquiring a broad knowledge and excellent research opportunities with modern technologies make Hohenheim the ideal place for studying biology.

**SINA HÜLSSE AND LEO FLIEGNER,
BSC STUDENTS IN BIOLOGY**

Master's Program in Biology

EXPLORING THE BUILDING BLOCKS OF LIFE

MOLECULES
— AND —
ORGANISMS



INFO

FACTS

Language of instruction:	German
Credits:	120
Standard period of study:	4 semesters
Available places:	30

ADMISSION REQUIREMENTS

Bachelor's degree:	With a profile in the biological sciences or equivalent
Language skills:	German (C1), English (B2)

SELECTION CRITERIA

Final grade of Bachelor's degree
Subject-specific coursework
Vocational training, work experience, internships, further qualifications

APPLICATION DEADLINES

First subject-related semester:	Winter semester: June 15
Second subject-related semester:	Winter semester: June 15 Summer semester: January 15

ABOUT THE PROGRAM

The Master's program in Biology at Hohenheim provides training in the modern biological sciences as a motor for innovation in the life sciences and beyond. The program is characterized by research-based teaching and is closely connected to ongoing research projects at our Faculty. A wide range of topics is covered by several departments which translate directly into extensive and diversified course offerings.

Our students can choose from all available courses, thus designing their course of studies of the Master's program in Biology according to their individual interests. Students can decide whether to study biology in its entire breadth or whether to focus on one or several of its sub-disciplines. They may also select one of our innovative specializations "Biodiversity and Integrative Taxonomy", "Biomolecular Interactions", "Adaptation of Plants to their Environment" and „Interaction Plants/Insects“. No matter which path our students choose, we will

COURSE OF STUDIES

	1 st MODULE SLOT	2 nd MODULE SLOT	3 rd MODULE SLOT	4 th MODULE SLOT
1 st SEM	Semi-Elective Modules Elective Modules			
2 nd SEM				
3 rd SEM	Research Module		Soft Skills	
4 th SEM	Master's Thesis Biology			

provide them with the necessary tools to navigate the entire discipline and approach any biological subject systematically. Our teaching philosophy is based on fostering independence and critical thinking skills in our students.

STRUCTURE OF THE PROGRAM

FIRST YEAR

During the week before the start of the semester, students are given an overview of the activities of each department of our biological institute, as well as of the structure and design of the program itself. Following this orientation phase, students decide how to design their course of studies in the first year of the program. When deciding to acquire general training in biology students are free to choose modules of all biological disciplines offered at Hohenheim. When seeking specialization students either focus on one of these sub-disciplines or choose one of our innovative specializations “Biodiversity

and Integrative Taxonomy”, “Biomolecular Interactions”, “Adaptation of Plants to their Environment” or “Interaction Plants/Insects”. For “thinking outside the box”, they also have the option of selecting an elective module from all of Hohenheim’s degree programs.

SECOND YEAR

The second year of the program is characterized by research projects, the possibility to study abroad, the acquisition of key competencies and the research-intensive Master’s thesis. The research project promotes practical work in the laboratory or the field. Students explore all aspects of conducting scientific research, including writing scientific papers ready for submission to a scientific journal. With the completion of the Master’s thesis our students demonstrate their ability to conduct and communicate scientific work and are able to transfer this attitude to other non-scientific areas.

Master's Program in AGRICULTURAL BIOLOGY

COMBINED KNOWLEDGE – TWO DISCIPLINES



INFO

FACTS

Language of instruction:	English
Credits:	120
Standard period of study:	4 semesters
Available places:	40

ADMISSION REQUIREMENTS

Bachelor's degree:	With a profile in agricultural sciences, biology, or equivalent
Language skills:	German (C1), English (B2)

SELECTION CRITERIA

Subject-specific knowledge in the field of agricultural science and analytical techniques
Internships, vocational training, work experience

APPLICATION DEADLINES

First subject-related semester:	Winter semester: June 15
Second subject-related semester:	Winter semester: June 15 Summer semester: January 15

ABOUT THE PROGRAM

The interdisciplinary and research-oriented Master's program in Agricultural Biology is jointly offered by the Faculties of Natural Science and Agricultural Science. In this program, students will learn how to identify and how to address global issues in Agricultural Biology. They will acquire the knowledge required for holistic approaches towards sustainable agricultural processes.

The program focusses on the molecular and physiological processes of plants, animals and microbes in interaction with their biotic and abiotic environment. It imparts advanced knowledge of soil, plants, livestock and microorganisms, which is applied by the students in research projects using state-of-the-art analytical tools, and the

latest methods and techniques in the field of computational life sciences and digitalization. Teaching is research-oriented, providing hands-on experience in close interaction with the research institutes of the university, to result in a solid basis for the future professional work in research, agriculture or industry.

The study program allows high flexibility to either gain broad knowledge in the different topics of Agricultural Biology, or to deepen knowledge on a specific subject. It includes bilingual courses and courses that are taught exclusively in English. International student exchange programs are supported, especially in the third semester.

COURSE OF STUDIES

1 st SEM	Plant, Animal, Soil – Physiology, Biochemistry	Genetic Variation and Evolution in Agricultural Systems	Quantitative Methods in Biosciences	Elective Modules	Elective Modules
	Microbiome Interactions with Plants, Animals, and Soils	Biodiversity, Ecological Interaction and Sustainability	System-Oriented Analyses of Biological Systems	From Genes and Gene Regulation to Transgenic and Edited Genomes	
2 nd SEM	Elective Modules, Research Module, International Exchange, Research Internship, Soft Skills				
3 rd SEM	Elective Modules, Research Module, International Exchange, Research Internship, Soft Skills				
4 th SEM	Master's Thesis Agricultural Biology				

STRUCTURE OF THE PROGRAM

FIRST YEAR

During the first semester the students acquire basic knowledge of the physiology, biochemistry and genetics of plants and livestock species, as well as their interaction and genetic variation in ecological and agricultural systems. Basic computer skills including programming, statistics, data acquisition, and data analysis tools are also taught in the first semester, to form the basis for subsequent elective modules. In the second semester, a broad spectrum of modules is offered covering the general topics of plant-soil-atmosphere interactions, livestock and environment, and food and nutrition. Students have the option to choose, and to develop their individual profile in either one of these areas. Modules are research-oriented focusing on analytical methods, data analysis and data interpretation.

SECOND YEAR

The second year is highly flexible and can be designed according to the individual student's interests. Students are free to choose from a large variety of courses, or to get hands-on research experience. This

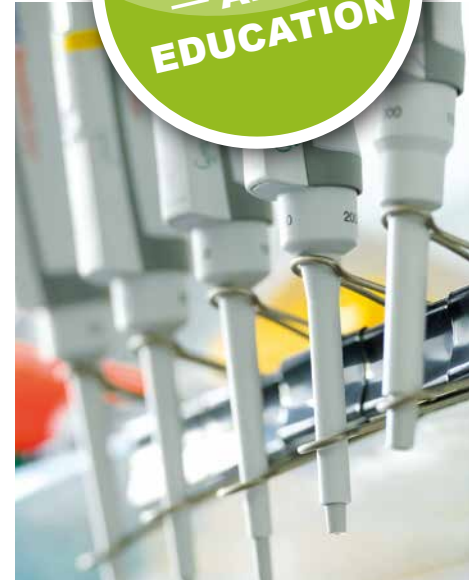
also includes extramural activities like internships in companies or academia, or attendance of international study exchange programs. A research-intensive Master' thesis concludes the program.



Teacher Program

Master of Education in Biology

TEACHER TRAINING IN BIOLOGY



INFO

FACTS

Language of instruction: **German**
 Credits: **120**
 Standard period of study: **4 semesters**
 Available places: **20**

ADMISSION REQUIREMENTS

Bachelor's degree: **In biology, including didactic training and educational sciences**
 Language skills: **German (C1)**

SELECTION CRITERIA

Final grade point average of Bachelor's degree
Subject-specific coursework

APPLICATION DEADLINES

First subject-related semester: **Winter semester: July 15**
Summer semester: January 15
 Second subject-related semester: **Winter semester: July 15**
Summer semester: January 15

BECOMING A TEACHER

In order to become a teacher at a *Gymnasium* – a school for higher secondary education in Germany – students need to complete both a Bachelor's and Master's degree designed to train teachers. Both degrees require students to study two major subjects including their respective didactic methods. The University of Hohenheim offers a Bachelor of Arts as well as a Master of Education teacher program in cooperation with the University of Stuttgart and the Ludwigsburg University of Education.

ABOUT THE PROGRAM

The major in biology is offered at the University of Hohenheim, while the second major subject is studied at the University of Stuttgart or, depending on the desired combination of major subjects, at the University of Tübingen, the State Academy of Fine Arts in Stuttgart or the State University of Music and the Performing Arts Stuttgart.

COURSE OF STUDIES

120 CREDITS	1 st SEM	BIOLOGY Modules in biology offered by all biological institutes of the Faculty of Natural Sciences	2ND SUBJECT Modules in 2nd subject	Educational sciences	Practical semester at a <i>Gymnasium</i>
	2 nd SEM				
	3 rd SEM	Didactic methods in biology	Didactic methods in 2nd subject		
	4 th SEM	Master's Thesis			

During the Master of Education program in Biology students build on their scientific and didactic expertise acquired during their Bachelor's training. They expand their knowledge and laboratory skills while learning more about didactic methods. After graduation, they complete their training as a trainee teacher at a *Gymnasium*. Following a successful traineeship, our graduates are ready to pursue a career in secondary teaching.

STRUCTURE OF THE PROGRAM

The program is designed with an open structure that grants students great freedom when planning their course of studies. Modules may be completed in a number of different combinations and the practical semester may be completed in either the first or third semester. Educational sciences form an integral part of the program and cover topics such as the analysis of teaching and learning processes or diversity, inclusion and individualization. Writing a Master's thesis in one of the major subjects or in educational sciences concludes the program.

EXTENSION MASTER OF EDUCATION

In addition to two mandatory major subjects, students have the opportunity to study a third major subject either during or after they have completed their Master of Education degree. The selection criteria are the same as those for the regular Master of Education program.

This Extension Master of Education comprises 120 credits and includes scientific modules in biology as well as modules on didactic methods for biology. The Master's thesis has to be written in biology; the topic may not be in educational sciences. After completion, students are awarded the degree Master of Education for a second time in addition to the degree obtained after completion of their regular Master of Education studies.

COURSE OF STUDIES

120 CREDITS	1 st SEM	Modules in biology	Didactic methods for biology
	2 nd SEM		
	3 rd SEM		
4 th SEM	Master's Thesis		



Nutritional Science

PROFILE

The discipline of nutritional science explores all aspects of human nutrition. With an increasing number of new food products on the market, with an increasing world population and demographic change, and with new trends, diets and fads, the questions of nutrition, what and how much to eat and what exactly food does to our bodies have never been more relevant. The study of nutritional science at the University of Hohenheim addresses these questions and more by uniting the biochemical and molecular-biological branches of the natural sciences with medicine and the social sciences to cover the entire range of the discipline of nutritional science both in research and teaching.

Nutritional Science at Hohenheim is represented by two institutes, the Institute of Nutritional Sciences and the Institute of Clinical Nutrition.

The **Institute of Nutritional Sciences** focuses on the natural scientific aspect of nutritional science, which is explored in four departments:

- Nutritional Science
- Food Biofunctionality
- Nutritional Biochemistry
- Microbiome and Applied Bioinformatics



The **Institute of Clinical Nutrition** focuses on medical and social aspects of nutritional science and consists of four distinct departments:

- Nutritional Medicine / Prevention and Gender
- Immunology
- Applied Nutritional Science / Dietetics
- Applied Nutritional Psychology

RESEARCH

Research in the field of nutritional science at Hohenheim covers different research areas. The first examines the physiological functions and the safety of micronutrients and bioactive components and their interrelations from cellular systems to human studies. The importance of micronutrients for human health and aspects of food security is investigated on a national and international level. The role of dietary host–microbiota interactions is studied by next-generation genome sequencing and other ‘omics’ techniques in combination with bioinformatic data mining.

Another main area of research covers the exploration, prevention and therapy of nutrition-related illnesses. Rooted mainly in medicine,

but also the social sciences, this research focus covers a range of issues from nutritional psychology to nutritional medicine.

The quality and breadth of research and teaching at the Institute of Nutritional Sciences and the Institute of Clinical Nutrition is guaranteed by the commitment of a team consisting of tenured professors and their dedicated members of scientific staff as well as their involvement in national and international networks.

Alongside the discipline of food science, our expertise in nutritional science is integrated into inter-facultative research conducted at the University of Hohenheim in transdisciplinary scientific centers. We are thus able to contribute to one of the University’s unique areas of research: the basic and applied research focused on the value-added food chain.

RESEARCH FOCUS

In view of the prevention of nutrition-related illnesses as well as the establishment of therapeutic concepts, new knowledge is generated in the following areas of the field:



- Physiological implications and safety of bioactive food compounds or additives
- Intestinal microbiota as a diagnostic and therapeutic target
- Impact of micronutrients and bioactive food compounds on cancer
- Food security
- Interrelations between diet, intestinal flora and the immune system
- Neurosensory regulation of nutrition-related processes
- Causes of food allergy or intolerance
- Regulation of energy partitioning and energy balance
- Environmental factors influencing eating behavior
- Clinical trials of concepts for the prevention and therapy of nutrition-related illnesses

Research topics related to specific diseases are studied together with the University Hospitals of Tübingen (partially within the framework of a joint Centre for Nutritional Medicine ZEM), Freiburg and Heidelberg. We are involved in diverse international projects in Asia and Africa through inter-facultative research efforts.

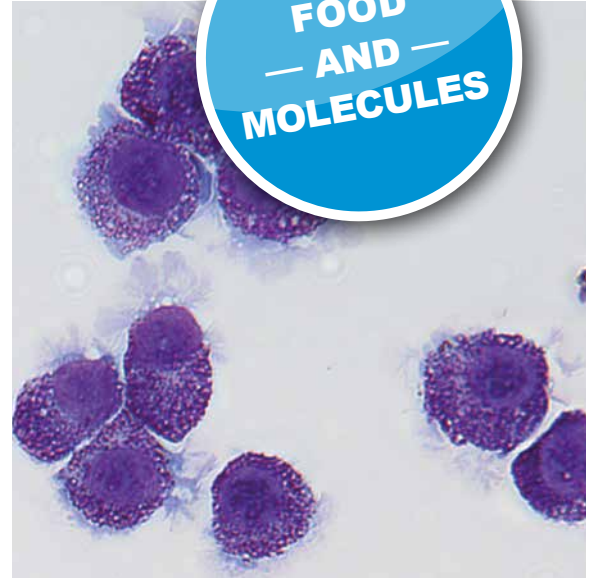


Research and teaching – Hohenheim offers excellent conditions for both.

PROFESSOR JAN FRANK, DEPARTMENT OF FOOD BIOFUNCTIONALITY

Master's Program in Molecular Nutrition

EXPLORING FOOD ON A MOLECULAR LEVEL



INFO

FACTS

Language of instruction: **German**
 Credits: **120**
 Standard period of study: **4 semesters**
 Available places: **24**

ADMISSION REQUIREMENTS

Bachelor's degree: **With a profile in the nutritional or natural sciences or equivalent, final grade corresponding to the German grade "gut"**
 Language skills: **German (C1)**

SELECTION CRITERIA

Final grade of Bachelor's degree
 Subject-specific knowledge and general knowledge in the natural sciences Internships, vocational training, work experience

APPLICATION DEADLINES

First subject-related semester: **Winter semester: June 15**
 Second subject-related semester: **Winter semester: June 15**
Summer semester: January 15

ABOUT THE PROGRAM

Molecular nutrition is concerned with the role of nutrition and the effects various substances contained in foods have on the human body on a cellular and molecular level. The program builds on the fundamental knowledge of natural and nutritional science obtained during subject-related undergraduate studies. Areas of special focus include cell biology, biochemistry, physiology and molecular medicine. Another essential component of the program is the acquisition of methodological expertise in the field of molecular biology.

Upon completion of the program graduates have extensive knowledge of nutrition-related illnesses. They know the effects and influence diverse food ingredients and value-added compounds have on cellular metabolisms, as well as the related physiological, immunological and pathophysiological reactions. Our graduates have extensive methodological expertise in cell and molecular biology and are able to transfer their skills to new areas of research and to adapt their knowledge for practical application.

COURSE OF STUDIES

1 st SEM	Introduction to Nutritional Science and Clinical Nutrition	Molecular Nutritional Science	Methods in Nutritional Science	Semi-elective Module
	Nutrigenomics	Semi-elective Module	Aspects of Lifestyle and Nutrition on Infection Immunology	Biofunctionality and Food Law
2 nd SEM	Elective Modules			
	Profile Area Experimental Project in Nutritional Science			
3 rd SEM	Master's Thesis			
4 th SEM				

STRUCTURE OF THE PROGRAM

FIRST YEAR

The first year of studies consists of compulsory and semi-elective as well as elective modules. These are mostly theoretical courses conveying extensive knowledge on nutrition-related illnesses and the connections between biochemical, physiological, immunological and patho-psychological processes inside the human body. In addition, students receive in-depth knowledge in nutrigenomics and molecular science with a focus on biochemical and patho-biochemical processes occurring when food is metabolized and are experts on the properties and functioning of biofunctional food ingredients.

SECOND YEAR

During the second year students largely design their course of studies themselves by choosing an area of specialization on an individual basis. This is made possible by the profile-building "Experimental Project in Nutritional Science" (EEP) and two elective modules. The EEP prepares students for writing a research-intensive

Master's thesis by imparting subject-specific competencies regarding methods and strategies for conducting scientific research. It gives students the opportunity to work on a scientific project independently, with supervision as required. The completion of an experimental Master's thesis demonstrates our students' ability to conduct independent scientific work diligently and correctly.

Master's Program in Clinical Nutrition

NUTRITIONAL SCIENCE IN A MEDICAL CONTEXT



INFO

FACTS

Language of instruction:	German
Credits:	120
Standard period of study:	4 semesters
Available places:	24

ADMISSION REQUIREMENTS

Bachelor's degree:	With a profile in the nutritional or natural sciences or equivalent, final grade corresponding to the German grade "gut"
Language skills:	German (C1)

SELECTION CRITERIA

Grade point average of Bachelor's degree
 Subject-specific knowledge and general knowledge in the natural sciences
 Internships, vocational training, work experience

APPLICATION DEADLINES

First subject-related semester:	Winter semester: June 15
Second subject-related semester:	Winter semester: June 15 Summer semester: January 15

ABOUT THE PROGRAM

Clinical nutrition combines the disciplines of nutritional science and medicine. Students learn how to explore interrelationships between nutrition and physiology, how to work towards developing therapeutic strategies based on these relationships and eventually transfer insights gained into practice in all areas of the medical field to effect prevention, cure and abatement of nutrition-related illnesses. As such, this program is focused on the effects certain foods have on healthy and sick persons. Knowledge from the field of biomedicine, gained through basic research, is applied within the context of clinical research. This also includes the socio-cultural, economic and psychological aspects of clinical medicine. Upon completion of



COURSE OF STUDIES

1 st SEM	Introduction to Nutritional Science and Clinical Nutrition	Clinical Dietetic Therapy	Introduction to Nutritional Psychology	Planning and Monitoring of Studies
	Applied Clinical Nutrition	Semi-elective Module	Semi-elective Module	Nutritional survey methods and dietetics
2 nd SEM	Elective Modules			
3 rd SEM	Profile Area Experimental Project in Nutritional Science			
4 th SEM	Master's Thesis			

the program students have extensive knowledge of nutrition-related illnesses. They know the effects and influence of various food ingredients and value-added compounds on the human cellular metabolism, as well as the related physiological, immunological and patho-physiological reactions. The Master's program in Clinical Nutrition is oriented towards clinical research in nutritional science and offers graduates the opportunity to work in a highly interesting and steadily expanding field.

STRUCTURE OF THE PROGRAM

FIRST YEAR

The first year of studies consists of compulsory and semi-elective as well as elective modules. These are mostly theoretical courses conveying extensive knowledge on nutrition-related illnesses and the connections between biochemical, physiological, immunological and patho-psychological processes inside the human body. In addition, students receive in-depth knowledge in nutrigenomics and

molecular science with a focus on biochemical and patho-biochemical processes occurring when food is metabolized and are experts on the properties and functioning of biofunctional food ingredients.

SECOND YEAR

During the second year students largely design their course of studies themselves by choosing an area of specialization on an individual basis. This is made possible by the profile-building "Experimental Project in Clinical Nutrition" (EEP) and two elective modules. This module prepares students for writing a research-intensive Master's thesis by imparting subject-specific competencies regarding methods and strategies for conducting scientific work by giving students the opportunity to work on a scientific project independently, with supervision as required. The completion of an experimental Master's thesis demonstrates our students' ability to conduct independent scientific work diligently and correctly.



Food Science and Biotechnology

PROFILE

Food Science and Biotechnology as well as Food Chemistry are innovative and highly diversified disciplines, combining the natural sciences and engineering in the study and analysis of food and cover all aspects of modern food processing and handling. This includes the transformation of plant and animal-based raw materials into consumable, high-quality food products, dietary supplements as well as functional active and value-added compounds. The chemical, enzymatical and microbiological analysis of food with regards to food safety, quality and hygiene completes the wide scope of this innovative discipline at the University of Hohenheim.

While food science, biotechnology and food chemistry are characterized by a strong natural scientific profile with close ties to the disciplines of biology and chemistry, our expertise is complemented by

an approach to food processing firmly based in engineering. The establishment of a dairy and a distillery for research and teaching, as well as the continuing expansion of our technical center, in which we explore new technologies for all areas of food processing, are central to food science at Hohenheim. Hohenheim is one of the very few universities in Germany with such a vast array of production facilities at the disposal of researchers and students and thus provides excellent opportunities to directly convert small-scale experimental work from the lab into pilot-scale production.

The rising demand for high-quality food requires a thorough understanding of the interdependencies between raw materials, active substances, microbiology and enzyme technology during the processing, packaging and storing of food products. Developing new



or optimizing existing food formulas and ensuring the safety of stable food is fundamental to the study and analysis of food compounds and products at Hohenheim.

This field is ideally complemented by advances in food chemistry regarding the detection of unnecessary risks caused by potentially hazardous compounds, such as contaminants, additives and residues, possibly contained in food and consumer products.

Modern laboratories and practical course rooms fitted with the newest equipment as well as technical centers with pilot plants for research and education provide our scientific staff with the opportunity to design and test new technological devices and processing techniques on a pre-industrial scale. These facilities also help students acquire practical skills in food processing and analysis.

RESEARCH

The combined interdisciplinary expertise of the Institute of Food Science and Biotechnology and the Institute of Food Chemistry covers all aspects of various food systems and their analysis. Specializations of our academic staff include the subject areas of food

microbiology, food biotechnology, food analysis, food chemistry, food physics, food process engineering as well as the sensory aspects of food.

Alongside the discipline of nutritional science, our expertise in food science is integrated into inter-facultative research projects conducted at the University of Hohenheim in transdisciplinary scientific centers. We are thus able to contribute to one of the University's unique areas of research: basic and applied research focused on the value-added food chain.

RESEARCH FOCUS

There are two main areas of research in the fields of food science, biotechnology and food chemistry at Hohenheim. The topic "Safe and technological processing of food systems" unites research on the interrelations between ingredients of foodstuffs, microorganisms or enzymes and the respective technological process used. Experimental research in this area is focused on the behaviour of individual ingredients during processing, the interactions of ingredients with and in the complex food matrix as well as with food contact materials.



The second research focus “Extraction of functional ingredients of foodstuffs” comprises activities in the exploration of the viability and safety of new compounds and additives for the processing of food. Research in this field seeks to improve the quality of food products in general, while also directly contributing to the development of new food products with additional benefits to specific groups of consumers.

Individual as well as inter-departmental contributions to these research foci include, amongst others:

- Interactions of microorganisms and enzymes with ingredients and the food matrix
- Development of product-specific analytical methods and measurement techniques for safe, stable and high-quality food products
- New and innovative technologies and processes for the development and processing of ingredients with specific techno-functional properties
- Connections between food structure, sensory perception and availability of value-added ingredients
- Basic research into the biochemical, physical and thermodynamic structure-bearing principles of food
- Implementation of new biotechnological and enzymatic processes and methods to food processing

In order to further expand and improve our successful ongoing research projects as well as to create sustainable synergies we are engaged in successful and intense cooperations with our excellent partners at the Technische Universität München (TUM), the Karlsruhe Institute of Technology (KIT), the German Institute of Food Technologies in Quakenbrück (DIL) and the Max-Rubner-Institute.



**We are
committed to
offering our
students the
best education
possible.**

**PROFESSOR LUTZ FISCHER, DEPARTMENT OF
BIOTECHNOLOGY AND ENZYME SCIENCE**

Master's Program in Food Biotechnology

EXPLORING THE BIG WORLD OF MICROORGANISMS AND ENZYMES



INFO

FACTS

Language of instruction:	English
Credits:	120
Standard period of study:	4 semesters
Available places:	22

ADMISSION REQUIREMENTS

Bachelor's degree:	With a profile in the natural sciences or engineering or equivalent
Language skills:	English (B2), German (B1)

SELECTION CRITERIA

Final grade point average of Bachelor's degree
Subject-specific coursework
Vocational training, work experience, internships, further qualifications
Result of mandatory aptitude assessment

APPLICATION DEADLINES

First subject-related semester:	Winter semester: May 15
Second subject-related semester:	Winter semester: May 15 Summer semester: January 15

ABOUT THE PROGRAM

The interdisciplinary and research-oriented Master's program in Food Biotechnology is concerned with the properties, the production processes, and the manifold applications of enzymes and microorganisms in the food industry, its supplying industries, and for bio-analytical purposes.

In this program students explore enzymatic production processes and familiarize themselves with biochemical methods, including the purification, characterization and immobilization of enzymes, enzyme kinetics, gene expression and the mutagenesis of recombinant enzymes.

Additionally, they gain a thorough understanding of pathogens and the importance of hygiene in food production, which is essential for utilizing microorganisms and enzymes in the life sciences.

STRUCTURE OF THE PROGRAM FIRST SEMESTER

During the first semester students acquire fundamental knowledge of the identification and recovery of enzymes and microorganisms in the life sciences and its connected industries. This includes a comprehensive introduction to food microbiology, enzyme analysis, and their corresponding methodologies and research strategies.

COURSE OF STUDIES

	1 st MODULE SLOT	2 nd MODULE SLOT	3 rd MODULE SLOT	4 th MODULE SLOT
1 st SEM	Food Microbiology	Biotechnology	Recombinant Proteins	Chemical Analytical Methods
2 nd SEM	Elective Modules			
3 rd SEM				
4 th SEM	Master's Thesis Food Biotechnology			

SECOND SEMESTER ONWARDS

From the second semester onwards students freely plan their studies according to their individual interests and preferred areas of specialization. Students may choose to either specialize in one specific field or to become a generalist in the field of food biotechnology. While the approach to the program may thus differ, students will, in all cases, increasingly conduct independent research from the second semester onwards.

Students can focus on enzymatic production processes and their utilization in the industrial sector and thus acquire expertise in biochemical methods, including the purification, characterization, and immobilization of enzymes, enzyme kinetics, and gene expression. Knowledge in the development and analysis of the effectiveness of biofunctional and technofunctional components, such as enzymes,

antioxidants, pro- and prebiotics, dyes, and bioactive peptides, will be acquired.

In the field of Food Microbiology a thorough understanding of pathogens and the importance of hygiene in food production is demanded, which is essential for utilizing microorganisms and enzymes in the life science industry. Students focus on controlling the reproduction of microorganisms – from starter cultures to bioreactors – and on determining their genetic functions by regulating gene expression to produce specific proteins.

A research-intensive Master's thesis, integrated into ongoing research at the Faculty, concludes the program.

Master's Program in Food Science and Engineering

FROM RAW MATERIALS TO SAFE FOOD PRODUCTS



**FOOD
— AND —
ENGINEERING**

INFO

FACTS

Language of instruction:	English
Credits:	120
Standard period of study:	4 semesters
Available places:	43

ADMISSION REQUIREMENTS

Bachelor's degree:	With a profile in the natural sciences or engineering or equivalent
Language skills:	English (B2), German (B1)

SELECTION CRITERIA

Final grade point average of Bachelor's degree
 Subject-specific coursework
 Vocational training, work experience, internships,
 further qualifications

APPLICATION DEADLINES

First subject-related semester:	Winter semester: May 15
Second subject-related semester:	Winter semester: May 15 Summer semester: January 15

ABOUT THE PROGRAM

Modern food processing is concerned with the transformation of plant-based and animal-based raw materials into value-added, safe and stable food or nutrient formulas. The Master's program in Food Science and Engineering is research-oriented and focuses on the interface between complex food matrices and technical processes in the development and production of food.

In this program students acquire expertise regarding the equipment and processes involved in the processing of food, combined with a

thorough understanding of the biogenesis of raw materials and their microbiological ecology. They learn to develop appropriate food formulas and processing techniques that allow for product-specific processing conditions in automated production processes using in-line sensor technology. The core of the program consists of the development of new technologies for the production of food products that meet consumer expectations as well as individual nutritional requirements, i.e. the transfer of basic research concepts into new technological approaches.

COURSE OF STUDIES

	1 st MODULE SLOT	2 nd MODULE SLOT	3 rd MODULE SLOT	4 th MODULE SLOT
1 st SEM	Analysis and Quality Assurance in the Food Production	Applied Mathematics for the Life Sciences	Food Process Design I – Efficient Processing and Transport Phenomena	Soft Matter Science I – Food Rheology and Structure
2 nd SEM	Soft Matter Science II – Food Physics	Elective Modules		
3 rd SEM	Project Work			
4 th SEM	Master's Thesis Food Science and Engineering			

STRUCTURE OF THE PROGRAM

FIRST YEAR

In the first year of the program the focus lies on connecting soft matter science approaches with microbiological knowledge and engineering methods needed to understand all aspects of the processing of a complex food matrix. Our students analyze treatment processes for food and explore new technology with which functional compounds from plant-based or animal-based raw materials may be efficiently gained, enzymatically modified, or stabilised by encapsulation. At the same time, they learn scientific approaches, including modern chemical, physical, molecular and statistical methods, as well as methods for modeling and simulating unit operations, processes and reactions. During practical courses acquired skills are put into practice, whilst the natural scientific, engineering and economic contexts of food processing are discussed during seminars.

SECOND YEAR

The second year allows students to freely plan their studies according to their individual interests and preferred areas of specialization. Knowledge and practical skills acquired in the first year are expanded by further specializing in selected food areas, e.g. meat, dairy, cereal, fruit, technology or food microbiology and engineering. Concurrently, the emphasis on conducting research increases. Project work modules provide our students with the opportunity to plan and execute a scientific project independently, with a supervisor providing necessary guidance.

The open structure of the second year allows the inclusion of a semester abroad at one of our many excellent partner universities or an extensive internship at research facilities in Germany or abroad or in the food industry. A research-intensive Master's thesis, integrated into ongoing research at the Faculty, concludes the program.

Master's Program in Food Chemistry

FOOD SAFETY AND CONSUMER PROTECTION



INFO

FACTS

Language of instruction:	German
Credits:	120
Standard period of study:	4 semesters
Available places:	25

ADMISSION REQUIREMENTS

Bachelor's degree:	Or equivalent with a min. 24 credits of applied studies in inorganic chemistry, physical chemistry, organic chemistry, and biology; min. 18 credits of applied studies in food analysis
Language skills:	German (C1)

SELECTION CRITERIA

Final grade of Bachelor's degree
Subject-specific coursework

APPLICATION DEADLINES

First subject-related semester:	Winter semester: June 15
Second subject-related semester:	Winter semester: June 15 Summer semester: January 15

ABOUT THE PROGRAM

The Master's program in Food Chemistry focuses on the properties and analysis of food and food-related products. As a specialized discipline in the field of chemistry, connecting the natural with the life sciences, the study of food chemistry is concerned with the safety of food, food contact materials, cosmetics and other consumer products.

Students acquire methodological expertise in general and instrumental analysis and know how to detect and avoid unnecessary risks caused by potentially hazardous compounds, such as contaminants, additives and residues, contained in food and consumer products. They learn about the production and complex composition of raw materials, foodstuffs and animal feed, as well as the reactions of ingredients with each other and their interaction with contact material during storage, processing and preparation. Moreover, students are able to determine the type, purity and effectiveness of additives and ensure their optimal and safe application.

STRUCTURE OF THE PROGRAM FIRST YEAR

In the first year of the program, students expand on knowledge and skills acquired during their undergraduate studies. Compulsory modules convey expertise in the areas of food chemistry and analysis, food toxicology, food microbiology and hygiene, food law and food process engineering. In-depth theoretical knowledge is applied in laboratory courses and provides students with the opportunity to transfer theory to practice by working on research-oriented exercises. Semi-elective modules are intended to bridge possible knowledge gaps in food law and instrumental analysis that may exist due to different undergraduate training. Developing essential methodological competencies and possessing the necessary know-how to plan and execute application-oriented research projects is part of the academic repertoire of our students after they have completed their first year.

COURSE OF STUDIES

1st SEM	Specialized Food Chemistry and Analysis I	Food Toxicology, Ecotoxicology and Environmental Analysis	Food Chemical and Toxicological Internship		Advanced Instrumental Food and Feed Analysis	Semi-Elective Modules
	Specialized Food and Feed Law	Food Microbiology and Hygiene	Food Microbiological Internship	Food Process Engineering		
			Specialized Food Chemistry and Analysis II	Research Internship I	Elective Modules	
	Master's Thesis Food Chemistry					

SECOND YEAR

The second year allows students to plan their studies according to their individual interests and preferred areas of specialization. Knowledge and practical skills acquired in the first year are expanded upon by further specializing in selected areas of the field. Methodological expertise is further refined as the emphasis shifts to conducting independent research. The research internship module gives students the opportunity to plan and execute a scientific research project independently, with a supervisor providing guidance as needed. The open structure of the second year also provides students with a great opportunity for studying abroad or for doing an internship at research facilities or in the life science industry. A research-intensive Master's thesis, integrated into ongoing research at the Faculty, concludes the program.



Master's Program in Food Systems

AN INTERNATIONAL ADVENTURE



INFO

FACTS

Language of instruction:	English
Credits:	120
Standard period of study:	4 semesters
Available places:	15 at the University of Hohenheim, 105 overall
Participating universities:	Aarhus University (DK), Universidad Autonoma de Madrid (ES), Lund University (SE), University of Turin (IT), University of Warsaw (PL), University of Reading (UK)

ADMISSION REQUIREMENTS

Bachelor's degree:	A Bachelor of Science degree in Agricultural Sciences, Biological/Life Sciences, Food Science, Chemistry, Food Safety or Nutrition. Other BSc degrees (180 ECTS or equivalent), proving the knowledge in the fields listed.
Language skills:	English (B2)

SELECTION CRITERIA

- Prior academic performance
- Entrepreneurial potential – the potential to effect innovative change in society e. g. through creativity, resilience, critical thinking and coping with ambiguity
- Participation in the selection interview

APPLICATION DEADLINES

Winter semester:	March 30 for non-EEA citizens, June 25 for EEA citizens
------------------	--

FOOD
— AND —
EUROPE



ABOUT THE PROGRAM

The Master in Food Systems (MFS) program is an integrated graduate degree program organized by the University of Hohenheim together with six other European universities within the Knowledge and Innovation Community EIT Food, in cooperation with industrial partners from across EIT Food's pan-European partner network.

In today's complex society there are many environmental and social challenges that need to be solved to create a more sustainable future. A major concern is how a growing population on a resource constrained planet relates to food. Understanding the food system is essential to develop ideas and solutions. In order to achieve impact, we require individuals who can transform these ideas into innovations – individuals that make a difference. This program is designed to give students both that deep insight into the food system, and the innovation and entrepreneurship competences to bring novel products and services to market to achieve positive change. Students in the program will develop knowledge and skills to be entrepreneurial leaders, and the network and resources to be effective agents of change in the food system. They will become members of the EIT FoodHive, EIT Food's professional network, to connect with other change makers and to build value together. The program is

COURSE OF STUDIES

1 st SEM	SPOC: introduction to Food Systems	AgFoodTech	Elective Module	Elective Module
2 nd SEM	Summer School	Track at 1 st Host institution semi-elective modules		
3 rd SEM	Emerging Technologies Business Case Study	Track at 2 nd Host institution semi-elective modules		
4 th SEM	Masters Thesis			

unique because of the mobility that enables students to learn at three of the leading universities in the domain of Food Systems in Europe. Furthermore, the program was co-created with a number of EIT Food's industrial partners, ensuring that the knowledge and skills are demanded in the sector.

COMBINED KNOW-HOW OF THREE UNIVERSITIES

A unique aspect of this program is that students not only get to know three cities and universities, but also three different academic perspectives on the food system. Each participating university provides a distinctly different track – a package of modules covering the specific area of expertise within that institution. That way, graduates profit from the combined know-how of three European universities, ensuring in-depth academic competencies in relation to otherwise separate dimensions of the food sector, such as personalised nutrition, food safety, or sustainable food processing.

Students starting the MFS at the University of Hohenheim will first engage in the track "AgriFood Science and Engineering" – a combination of agricultural and food sciences with a technical focus, covering primary production principles as well as conversion and processing to value added ingredients and innovative food products.

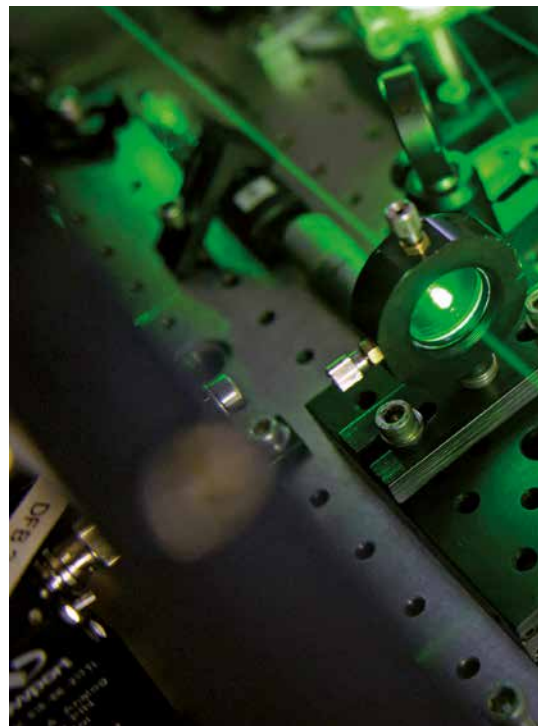
The module AgFoodTech provides an introduction and overview to the track, complemented by two electives from a pool of modules from the fields of food science or agricultural technology.

COMMON MODULES FOR INTEGRATED KNOWLEDGE

The modules each partner university offers are coupled with obligatory modules on innovation and entrepreneurship that are shared for all students. These overarching modules are developed jointly between the universities. They enable students to integrate the in-depth perspectives built up throughout their journey into an appraisal of the food system as a whole. As a result, graduates gain a truly systemic comprehension of how food is produced, processed, marketed and consumed.

READY FOR THE FUTURE

In addition, pan-European activities at industrial partner sites ensure bonding of the international cohort and facilitate the creation of an international alumni network, with alumni activities offered by EIT Food. Through cooperation with and mentoring by industrial partners, the program is designed to foster entrepreneurial spirit and practical skills – resulting in a profile that will be highly sought after in the food sector.



Fundamental Subjects

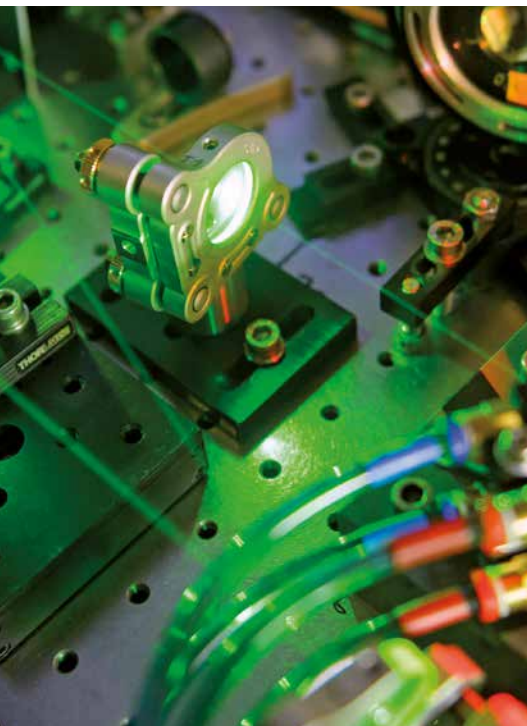
PROFILE

The disciplines of chemistry, applied mathematics as well as physics and meteorology form integral parts of all degree programs offered at the Faculty of Natural Sciences. As such, the institutes representing these disciplines at Hohenheim operate between the demands of specialized teaching for our interdisciplinary degree programs and their drive to conduct strong individual research within their respective fields. Excellent postgraduate education covers the entire range of chemistry, mathematics and physics.

The contributions of the basic subjects towards our degree programs are of fundamental importance to interdisciplinary teaching and learning on the undergraduate and graduate level. Their contributions also shape the profiles of these disciplines at Hohenheim in unique ways.

RESEARCH IN CHEMISTRY

Research in chemistry is split into two distinct fields: bioinorganic and bioorganic chemistry. Research conducted at the Department of Bioinorganic Chemistry mainly consists of experiments in the laboratory and, to a lesser extent, field studies. Their research can be categorized into three specialized areas: abiotic organic reactions on (young) terrestrial planets, the search for chemical biosignatures on other planets (especially on Mars) and chemical evolution on primordial volcanic islands. The experimental work includes aspects of organic, inorganic and mineral chemistry. The background of this research stretches from the chemical and physical conditions on early Earth to the instrumentation of Mars rovers, making cooperation with scientists from other disciplines, in particular planetary scientists, indispensable. Various state-of-the-art analytical and synthetic techniques are used to work on these highly interdisciplinary topics.



Research within the Bioorganic Chemistry group covers three topics, namely the isolation and structure elucidation of natural products, the development of new synthetic methods and the invention of new sensors. New synthetic methods for the selective, efficient and sustainable construction of heterocycles as well as carbocycles are not only of great interest to chemists involved in the synthesis of bioactive molecules but also to every scientist working in the fields of the life sciences and materials sciences. This is particularly true if new methods are widely applicable and expand the arsenal of the known synthetic methodology. One research group has an interest in transition metal-catalyzed and enzyme-catalyzed transformations. Typical examples include copper-catalyzed domino reactions as well as enzyme-initiated domino processes. Another focal point of the research program is the development of enzyme-catalyzed oxidations using aerial oxygen as the oxidant. The third project is de-

voted to the study of compounds with oxygen pressure- or temperature-dependent luminescence and their development to pressure sensors (pressure-sensitive paints) and temperature sensors (temperature-sensitive paints). These sensors can be applied in the field of aerodynamics.

RESEARCH IN APPLIED MATHEMATICS AND STATISTICS

Along with the advances in experimental techniques comes a transformation of the life sciences into a highly quantitative discipline. While statistics and bioinformatics are widely used for data analysis, applied mathematics is more and more acknowledged as an equal contributor in the quest to understand the functional interactions of cellular components, organs and systems. Research at the Institute of Applied Mathematics and Statistics focuses on the development and application of computational techniques from the areas of dif-

ferential equations, inverse problems and statistics for answering questions arising in molecular and systems biology, food technology and agriculture. The modeling and simulation of complex biological systems allows the generation of hypotheses and the design of experimental studies; in return, the accurate experimental data will challenge those hypotheses and drive the nature of the mathematical models from a phenomenological to a mechanistic one. In an interdisciplinary and iterative cycle between measuring and modeling, inconsistencies are resolved and new information is fed into theory revisions. Consequently, the Institute forms an integral part in the interdisciplinary endeavours of the Faculty of Natural Sciences.

RESEARCH IN PHYSICS AND METEOROLOGY

Research is mainly linked to atmospheric sciences and the Master's program in Earth and Climate System Science. We focus on feedback processes in the soil–vegetation–atmosphere system. Advanced understanding of these processes is crucial for the accuracy of all weather and climate models. Additionally, close attention is paid to the human influence on these compartments of the Earth system. Working at the interface between observations and high-resolution modeling, these research activities contain three components: (1) the development and application of unique laser remote sensing systems for water vapour and temperature measurements, (2) convective-scale data assimilation of new observations such as radar and GPS in weather forecast models, and (3) weather and climate modeling with improved representation of land–surface–atmosphere feedback and biological–hydrological processes. The examination of the biosphere and its importance within the Earth system in a changing climate is one of the key topics explored through inter-departmental research at the Faculty. We also collaborate with many excellent partners: the World Weather Research Program (WWRP), the National Center for Atmospheric Research (NCAR) in the U.S., research institutes of the Helmholtz Association and collaborative research units of the German Research Foundation (DFG).



**Studies at
Hohenheim: cross
linking cutting-edge
facilities, excellent
support and a
friendly family
atmosphere.**

**ALEXANDER ENGEL,
DOCTORAL CANDIDATE IN CHEMISTRY
CHRISTINA HOFMANN,
BSC STUDENT IN NUTRITIONAL SCIENCE**

Master's Program in Earth and Climate System Science

UNDERSTANDING THE EARTH AND CLIMATE SYSTEM

**TRANSDISCIPLINARY
— AND —
HOLISTIC**



INFO

FACTS

Language of instruction:	English
Credits:	120
Standard period of study:	4 semesters
Available places:	10

ADMISSION REQUIREMENTS

Bachelor's degree:	With a profile in the natural, geo or agricultural sciences or equivalent
Language skills:	English (B2)

SELECTION CRITERIA

Final grade of Bachelor's degree
Subject-specific coursework

APPLICATION DEADLINES

First subject-related semester:	Winter semester: March 15 for International citizens May 15 for German citizens
Second subject-related semester:	Winter semester: March 15 for International citizens May 15 for German citizens Summer semester: January 15

ABOUT THE PROGRAM

The innovative Master's program in Earth and Climate System Science is based on the comprehensive scientific understanding of the Earth as a system. Aspects of the natural sciences are linked to topics in the agricultural sciences and economics in this transdisciplinary program.

The focus of this program is on the analysis of the interactions of the Earth system's various components. This requires the study of human activities, population growth,

food production and security, land use and management, as well as climate change. The analysis and simulation of related phenomena, such as feedbacks in the soil–vegetation–atmosphere system and their impacts on the regional climate, allow for the creation of models, which provide useful insights into Earth system functions. Coupling climate models with agricultural and economic models provides a broader view of the Earth system and aids in creating concepts of sustainable development for all aspects of human life on Earth.

COURSE OF STUDIES

4 th SEM 3 rd SEM 2 nd SEM 1 st SEM	Lecture Series	Mathematics and Computational Sciences of the Earth System	Economics and Management	Weather and Climate Physics	Chemistry of the Earth and Climate System	Agricultural Production of Biobased Resources
	Climate History and Evolution of the Earth System	Debate Seminar	Energy and Water Regime at the Land Surface	Measurement, Modeling and Data Assimilation	Elective Modules	
	Elective Modules					
	Master's Thesis Earth and Climate System Science					

STRUCTURE OF THE PROGRAM

FIRST YEAR

In the first year of the program, our students are brought to the same level of knowledge in physics, chemistry, biology, mathematics as well as economics. Our students acquire a comprehensive overview of the Earth system and familiarize themselves with its basic functioning. During the course of the second semester, students develop transdisciplinary thinking skills essential to Earth system science by taking modules with cross-cutting topics, combining the natural and agricultural sciences with economics. This way they arrive at a unique perspective on our Earth. Students also take measurements in the field, analyze and interpret their data and start to apply computer models. With the completion of the first year, students are able to create a representation of the state of the Earth system at a given time by combining measurement data with physical process descriptions by means of data assimilation. Starting in the second semester and intensified in the third, our students have the opportunity to choose elective modules based on their personal and professional interests.

SECOND YEAR

During the second year students expand their expertise in creating models based on collected data by more strongly factoring in social and economic aspects. Students are now able to create holistic models of the Earth system, enabling them to develop concepts of sustainability for its protection. Furthermore, the second year allows students to freely plan their studies according to their individual interests and preferred areas of specialization. The open structure of the third semester also provides students with an excellent opportunity to study abroad. Upon completion of the program, our graduates have acquired a comprehensive understanding of the Earth system and knowledge of the various ways in which human behaviour influences this fragile system.

Master's Program in Bioeconomy

INTER-FACULTATIVE MASTER'S PROGRAM



ABOUT THE PROGRAM

The Master's program in Bioeconomy is jointly offered by Hohenheim's three faculties and focuses on providing students with a comprehensive and systematic overview of all aspects of the production of (new) biobased products. In this program, students will examine all aspects of renewable resources in the biobased value chain: their production and utilisation in agricultural ecosystems in diverse climatic regions, their ecological performance, their properties, means of conservation, and biotechnological and sustainable industrial processes to convert these resources into (new) biobased products. In addition, students will consider the potential market launch of these innovations on an individual and societal basis.

INFO

FACTS

Language of instruction: **English**
 Credits: **120**
 Standard period of study: **4 semesters**
 Available places: **45**

ADMISSION REQUIREMENTS

Bachelor's degree: **With a profile in the natural sciences, agricultural sciences or economics or equivalent**
 Language skills: **English (B2)**

SELECTION CRITERIA

Final grade of Bachelor's degree
 Subject-specific knowledge
 vocational training, work experience

APPLICATION DEADLINES

First subject-related semester: **Winter semester: June 15**
 Second subject-related semester: **Winter semester: June 15**
Summer semester: January 15

**CHANGE
THE
SYSTEM.
SHAPE
THE
FUTURE.**



COURSE OF STUDIES

1 st SEM	Agricultural Production of Biobased Resources	Properties of Biobased Resources and Products	Inter- and Transdisciplinary Research Approaches	Economics and Management	Natural Science Concepts
	Sustainable Industrial Processes	Farm Economics, Risk Management and Life-cycle Sustainability Assessment	Economic Policy Analysis of the Bioeconomy	Projects in Bioeconomic Research	Elective module
2 nd SEM	Elective modules				
3 rd SEM	Elective modules				
4 th SEM	Master's thesis				

As an interdisciplinary program, it enables a systemic analysis of the entire biobased value chain. Consequently, students will acquire the expertise necessary to consider a range of issues in this complex field from various perspectives: of producers of new resources and products; of those already producing and seeking to introduce renewable resources and their corresponding products to the market; and of those trying to gauge the need and acceptance of such products. This reconciliation of varying interests is one of the strengths of this program and its graduates.

STRUCTURE OF THE PROGRAM

FIRST YEAR

During the first year, students obtain basic knowledge about all aspects of bioeconomy and the bio-based value chain. To ensure that all students are able to successfully complete the program despite having different academic educations, three bridging modules are offered. In addition, in several compulsory modules students learn information and methods necessary for a systematic analysis of the bio-based economy.

SECOND YEAR

The second year of studies offers the opportunity to design the own curriculum by choosing from a range of elective modules and specialising in the individually preferred areas. In the compulsory module "Projects in Bioeconomic Research," students apply the knowledge gained by carrying out research projects together with the private sector and other organizations that look at the entire bio-based value chain and value network. With the completion of the Master's thesis our students demonstrate their ability to work on interdisciplinary scientific topics to find solutions for the major challenges of our time – climate protection, food security, resource conservation, and sustainable management of natural resources.



Doctoral Degree Program

Natural Sciences (Dr. rer. nat.)



INFO

FACTS

Language of instruction: **English/German**
 Credits: **180**
 Standard period of study: **6 semesters**
 Available places: **unlimited**

ADMISSION REQUIREMENTS

Acceptance as a doctoral candidate at the Faculty of Natural Sciences

APPLICATION DEADLINES

Application and admission to the program is possible anytime.

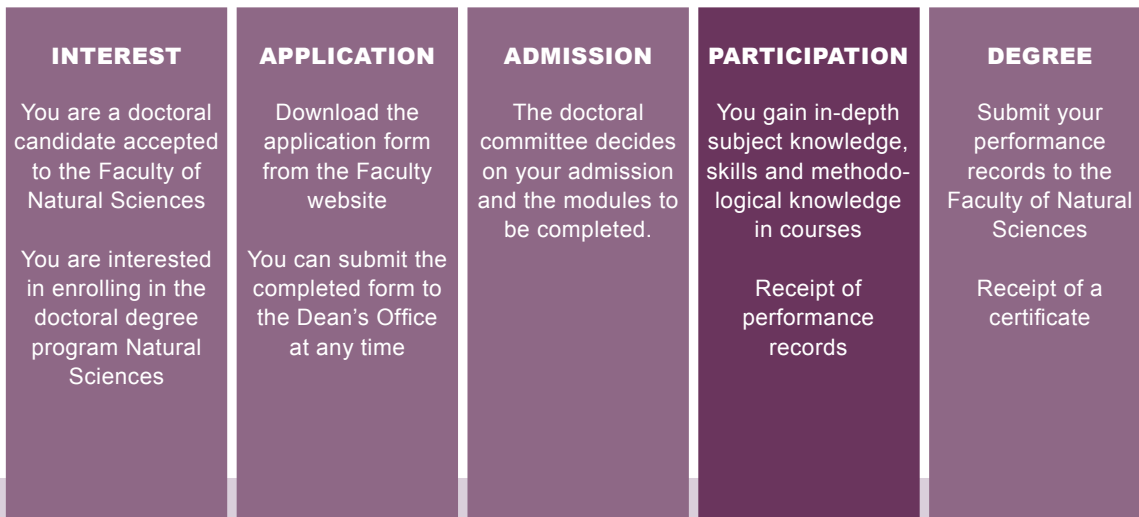
ABOUT THE PROGRAM

The Faculty of Natural Sciences offers a structured doctoral study program for doctoral students accepted at the Faculty of Natural Sciences. Two different research training groups are offered: „Natural Sciences“ and „Biodiversity throughout times“. The second one in cooperation with the Stuttgart State Museum of Natural History. The goal of the doctoral study program is to give doctoral candidates in the Faculty of Natural Sciences structured assistance in completing their dissertation for the “Doctor of Natural Sciences (Dr. rer. nat)” and to convey more in-depth subject knowledge, abilities, and methods reflecting the current state of natural scientific research and scientific methods.

STRUCTURE OF THE PROGRAM

The doctoral candidates first and foremost complete their scientific research work and the modules of the doctoral degree program. The dissertation and the corresponding oral examination contribute 150

STEPS IN THE DOCTORAL DEGREE PROGRAM NATURAL SCIENCES



COMPLETE YOUR DOCTORAL THESIS (WITHIN A MAXIMUM OF 6 YEARS)

credits towards the program degree. In addition, at least four modules totaling at least 30 credits need to be completed during the program. All modules on offer are open to candidates in any year of the program and are offered at least once per year.

Students choose modules from the following categories:

- Modules in which candidates deepen their knowledge in scientific methods and good research practice.
- Attendance of summer schools and / or at least one national or international conference at which the results of the doctoral work is presented as a poster or presentation.
- Specialization modules in which candidates acquire in-depth knowledge in the field of their dissertation.
- Participate in teaching and advising tasks.

HOHENHEIM GRADUATE ACADEMY

The "Hohenheim Graduate Academy" was created with the goal to adapt the doctorates undertaken at the University of Hohenheim to international standards and to implement a complete centralization of the administration of the doctoral work. With the establishment of this academy, all doctoral activities are given University-wide unified standards and the consistent implementation of these standards is guaranteed.

The Faculty of Natural Sciences cooperates closely with the Hohenheim Graduate Academy. While the academy takes on the entire administration of all doctoral procedures, coordinates matters relevant to the doctoral programs, and offers services for networking, advising, and further qualifications, the Faculty supervises the scientific work conducted by our doctoral candidates. We offer our young scientists subject-specific support and ensure the quality of their work.

Bachelor programs at the Faculty of Natural Sciences

BIOLOGY

The Bachelor's program in Biology prepares students for their graduate studies by providing knowledge of the fundamentals of the various sub-disciplines of the field. Equipped with expertise in natural scientific methodology, our students are well prepared to pursue careers in academia and beyond.

Available places: **100**

AGRICULTURAL BIOLOGY

The Bachelor's program in Agricultural Biology is offered by the Faculty of Natural Sciences in close cooperation with the Faculty of Agricultural Sciences. The scientific knowledge imparted to students is applied to specific problems of modern agricultural production and enables them to work on optimizing and further developing the global agricultural system for food security, sustainability and social acceptance. Agricultural Biology is only offered at the University of Hohenheim.

Available places: **unlimited**

TEACHER PROGRAM IN BIOLOGY

The Faculty of Natural Sciences offers prospective teachers the possibility to study to become a teacher at a Gymnasium (school for advanced secondary education) in Germany. The Bachelor of Arts program prepares students for a Master of Education in Biology, which is also offered at the University of Hohenheim. In addition to expertise in biology, including its sub-disciplines, students receive didactic training.

Available places: **22**

NUTRITIONAL SCIENCE

The Bachelor's program in Nutritional Science covers a multidisciplinary field. Firmly rooted in the natural sciences, the focus of the program is on the exploration of interdependencies between food ingredients and the complex metabolism of the human body. Equipped with expertise in natural scientific methodology, our students are well prepared to pursue careers in academia and beyond.

Available places: **130**

FOOD SCIENCE AND BIOTECHNOLOGY

The Bachelor's program in Food Science and Biotechnology is an interdisciplinary program, focused on the scientific methodology required to develop technological processes for the processing of food. Graduates of the program are well prepared to pursue careers in academia or the life science industry.

Available places: **unlimited**

FOOD CHEMISTRY

The Bachelor's program in Food Chemistry is offered by the University of Stuttgart in close cooperation with the University of Hohenheim. Students learn the fundamentals of the field with a strong focus on the transfer of theoretical knowledge to its practical applications in the laboratory. The program prepares students to pursue a Master's degree in Food Chemistry at the University of Hohenheim, offered in cooperation with the University of Stuttgart.

Available places: **40**

CONTACT & IMPRINT

UNIVERSITY OF HOHENHEIM

Faculty of Natural Sciences

Garbenstraße 13 | 70599 Stuttgart | Germany

T +49 711 459 23770 | F +49 711 459 22821

E natur@uni-hohenheim.de | W natur.uni-hohenheim.de

Edited by:

**Faculty of Natural Sciences
Dean's Office**

Layout:

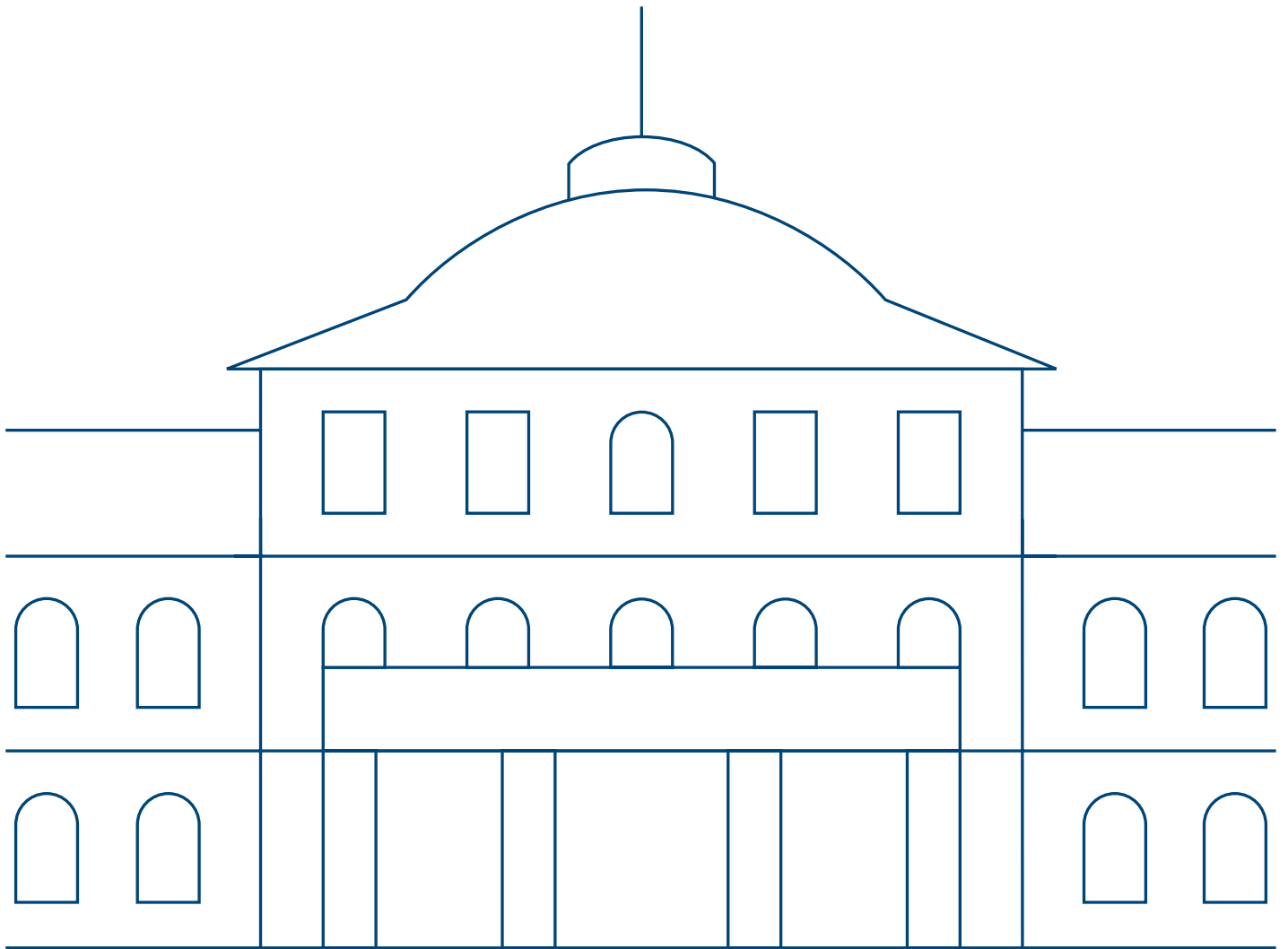
**unger+ kreative strategien GmbH,
Stuttgart**

Circulation:

digital

Photographs:

**Martin Stollberg
Stuttgart Marketing
Universität Hohenheim**



University of Hohenheim
Faculty of Natural Sciences

Garbenstraße 13 | 70599 Stuttgart | Germany

T +49 711 459 23770 | **F** +49 711 459 22821

E natur@uni-hohenheim.de

W natur.uni-hohenheim.de/en/home

