



UNIVERSITÄT
BAYREUTH



LIFE
SCIENCES
Food · Nutrition · Health

Module Handbook

Food Quality and Safety M.Sc.
University of Bayreuth

General Information and Reading Notes

A central component of the Bologna process is the modularisation of degree programmes which means a switch from the former course system to a modular system by grouping thematically related courses into course bundles – or modules.

This module handbook contains the description of all modules offered in the degree programme. The module handbook gives an overview and provides students, prospective students, and other interested persons with information on the content of the individual modules, their qualification goals, as well as qualitative and quantitative requirements.

Table of Contents and Index

The table of contents provides an overview of the module areas and modules of the degree programme. The information in brackets after the title of a module contains the date on which its description was last updated. Example of notation: 24W denotes the winter semester 2024/25, 25S denotes the following summer semester 2025.

The index at the end of the module handbook lists all modules of the degree programme in alphabetical order.

Module description

The description of a module includes its learning content, objectives, and assessment methods. For modules with multiple assessments, the weight of each assessment toward the final grade is specified. The *examination and study regulations* for each degree program define the scope and duration of assessments.

The QR code in the description links to the module's website. There, you can find the courses that belong to this module and see which other degree programs include this module.

Legal Disclaimer

Module descriptions provide students with detailed information regarding the content and the structure of the modules of a degree program. Only the relevant *examination and study regulations* are legally binding.

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Fak726889: Food Microbiology

Valid from: 01.10.2025

Teaching language English	Duration one semester	Contact hours (in hours) 90	Self-study hours (in hours) 60
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Lackner, Gerald; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	7	3.5
Semester tasks	3	1.5

Prerequisites

Basic knowledge in chemistry and biology.

Learning objectives

The students acquire basic knowledge about the structure and function of microbial cells, their key roles for food spoilage, food production, and human health. Moreover, principles of detection of microorganisms as well as hygiene concepts will be introduced.

Learning contents

Lecture:

- Microorganisms
- Spoilage
- Food preservation
- Foodborne illness
- Microorganisms in food production (e.g. fermentation)
- Principles of hygiene concepts e.g. HACCP

Exercise

- Deepening and reinforcing lecture content
- Calculations related to the lecture and practical course

Lab work:

- Basic microbiological examination techniques
- Quantitative and qualitative detection of microbial contamination in food
- Growth inhibitors (e.g. antibiotic residues) in food
- Kefir fermentation

Type and scope of the courses

Lecture (2 hours per week)

Exercise (1 hour per week)

Laboratory course (3 hours per week or as a block course during the lecture-free period)

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Fak726890: Crop Plant and Animal Biology

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 105	Self-study hours (in hours) 45
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Henkel-Oberländer, Janin; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	7	3.5
Semester tasks	3	1.5

Prerequisites

Basic knowledge in biology

Literature recommendations for preparation:

- Molecular Cell Biology; H. Lodish, A Berk, CA Kaiser, M Krieger, A Bretscher, H Ploegh, A Amon, KC Martin
- Cell Biology; TD Pollard, WC Earnshaw, J Lippincott-Schwartz, GT Johnson
- Molecular Biology of the Cell; B Alberts, A Johnson, J Lewis, D Morgan, M Raff, K Roberts, P Walter
- Essentials of Biochemistry; HJ Fromm, M Hargrove

Learning objectives

The students acquire basic knowledge in molecular biology, biochemistry and cell biology of plants and mammals.

Furthermore, they learn basics in physiology and know major metabolic pathways.

Based on this knowledge, they are able to understand the role of food composition in the context of human nutrition and health.

Learning contents

- Components of eukaryotic cells and their functions
- Morphology and anatomy of plants and mammals
- Basics in molecular biology and cell signalling
- Principles of energy metabolism
- Major catabolic and anabolic pathways
- Basics in genetics
- Agriculture and global biogeochemical cycles
- Practical lab work with basic methods in molecular biology and biochemistry

Type and scope of the courses

Lecture/seminar (4 hours per week)

Laboratory course (3 hours per week or as a block course during the lecture-free period)

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Fak726891: Nutritional Biochemistry, Physiology and Immunology

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 82	Self-study hours (in hours) 68
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Henkel-Oberländer, Janin; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	7	3.5
Semester tasks	3	1.5

Prerequisites

participation in module "Crop Plant and Animal Biology" recommended

Learning objectives

The students acquire basic and specific knowledge in the digestion of food, the functions of macro- and micronutrients in human nutrition and their role in the regulation of metabolic homeostasis. The students know nutrition-related diseases and can describe the pathogenesis of over- and undernutrition. They understand the principles in immune response and can explain the organization of the immune system.

Based on this knowledge, they are able to understand the role of food composition in the context of human nutrition and health.

Learning contents

- Functional anatomy of the gastrointestinal tract
- Digestion of macronutrients
- Regulation of energy metabolism
- Role of macro- and micronutrients in human nutrition
- Malnutrition: pathogenesis of undernutrition and overnutrition
- Control of food intake and sensory biology
- Organization and functions of the immune system
- Practical lab work with methods in (molecular) physiology

Type and scope of the courses

Lecture (2 hours per week), seminar (1 hour per week),

Laboratory course (3 hours per week = 5 full days as a block course during the lecture-free period)

Literature:

Literature recommendations for preparation:

- Human Physiology: An Integrated Approach; Silverthorn DU; Pearson
- Marks' Basic Medical Biochemistry – A Clinic Approach; Wolters Kluwer; Lieberman M, Peet A
- Gastrointestinal Physiology; Elsevier; Johnson LR-Costanzo LS: Broad Review Series – Physiology; Wolters Kluwer
- Doan, T: Lippincott Illustrated Reviews – Immunology; Wolters Kluwer

List of topic-specific literature recommendation is provided in E-Learning course

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Fak726892: Chemical Food Analysis

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 75
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Römpp, Andreas; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	7	3.5
Semester tasks	3	1.5

Prerequisites

- Basic knowledge in chemistry and physics
- Basic knowledge of statistical methods
- Practical experience in wet lab chemistry

Learning objectives

The students acquire detailed and differentiated knowledge about analytical techniques used in food analysis. Sample preparation and data analysis and interpretation are also essential topics covered in this module. Based on this knowledge, the students are able to assess capabilities and limitations of a range of analytical approaches. The students are also able to critically evaluate their own experimental data as well as published studies.

Learning contents

This course covers classical wet lab chemistry as well as instrumental techniques such as spectroscopy, chromatography and mass spectrometry. It also includes a range of analytical protocol for specific analytes and food items. This includes major and minor constituents, food additives as well as biological and chemical contaminants.

Type and scope of the courses

Lecture (2 hours per week)

Laboratory course (3 hours per week or as a block course during the lecture-free period)

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Fak726893: Food Metabolome and Toxicology

Valid from: 01.04.2024

Teaching language English	Duration two semesters	Contact hours (in hours) 90	Self-study hours (in hours) 60
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written or oral exam	7	3.5
Semester tasks	3	1.5

Prerequisites

Basic knowledge in chemistry and biology. Practical experience in chemistry and biology lab courses.

Literature recommendations for preparation:

- Food Chemistry, Belitz, H.-D., Grosch, Werner, Schieberle, Peter,
- Introduction to Food Toxicology, Takayuki Shibamoto, Leonard F. Bjeldanes
- Food Analysis, S. Suzanne Nielsen

Learning objectives

With over 25 000 compounds known in various foods, the food metabolome is extremely complex. The students acquire detailed and differentiated knowledge about essential and non-essential compounds derived from foods. Furthermore, the module also teaches a foundational understanding of residues and contaminants their toxic effects, toxicokinetics and toxicodynamics.

Standard analysis and testing procedures for food components, pesticides, food additives, and other xenobiotics will be explained.

Learning contents

Lecture:

- Profound knowledge in food chemistry, including macro and minor components, minerals, trace elements, vitamins and phytochemicals
- Basic knowledge about residues and contaminants
- Toxicological effects, critical values including supporting examples
- Basic principles of the metabolism of xenobiotics (ADME - Absorption, Distribution, Metabolismus und Elimination)

Seminar and laboratory course:

- Basic knowledge analysis of the food metabolome
- Basic principles for testing procedures

Type and scope of the courses

Lecture (2 hours per week)

Seminar (1 hour per week)

Laboratory course (3 hours per week or as a block course during the lecture-free period)

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Fak726839: Data Analysis and Statistics

Valid from: 01.10.2025

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency winter semester	Person responsible for the module von Philipsborn, Peter; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	1	5

Prerequisites

None

Learning objectives

The students acquire basic knowledge about data types, descriptive and inferential statistics. Furthermore, they will learn about types of data visualisation and their advantages and disadvantages. They can use software to analyse and visualise data. Based on this knowledge they are able to choose the appropriate types of analysis and visualisation for a range of problems.

Learning contents

- Types of data
- Descriptive statistics
- Inferential statistics
- Data visualisation

Type and scope of the courses

Lecture and seminar (2 hours per week)

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Fak720426: Introduction to Law and Food Law

Valid from: 01.04.2020

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Purnhagen, Kai; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	1	5

Prerequisites

None

Learning objectives

At the end of the course students are expected to

- Describe legal families, understanding their differences and analyze their interactions through examples
- Distinguish between different branches of a legal systems and analyze their interactions through examples
- Distinguish between national, international and supranational legal systems and analyze their interactions,
- Distinguish between different sources of international law
- Describe the main features of the TBT and the SPS agreement
- Describe the features of the peaceful settlement of disputes under the WTO
- Know the main aspects of International Human Rights Law
- Describe the role and the characteristics of private standards
- Describe the roles and functions of EU institutions, as well as the basis of their historical development
- Be able to assess whether a competence is within the sphere of the EU or of the Member States
- Be able to describe the ordinary legislative procedure in the EU
- Understand the 'four fundamental freedoms' and the functioning of the internal market
- Describe the "Brussel effect"
- Describe the principles at the base of EU Food Law and know its main provisions
- Describe the main provisions of selected pieces of EU food legislation (e.g. labelling law, novel food regulation, GMO directive, hygiene package)
- Identify the main features of the CAP
- Develop legal thinking skills
- Be able to recall legal information (laws, interpretations, cases) from the major EU law databases,
- Bring theory and practice together, applying the legal perspective acquired in the lectures to real-life examples

Learning contents

The purpose of the course is to provide students with a well-rounded introduction to law, with a specific focus on EU Law, International Law, and EU food law. The course is divided into three thematic blocks, starting with a general introduction to law and legal thinking, followed by an introduction into International Law and institutions and by an overview on the European Union law and Food Law specifically.

Type and scope of the courses

Lecture (2 hours per week)

Tutorial (2 hours per week)

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Fak720427: Food Safety and Risk Management Law

Valid from: 01.04.2020

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Purnhagen, Kai; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	1	5

Prerequisites

No previous knowledge is required to attend the course. However, the previous attendance and completion of the course "Introduction to Law and Food Law" is strongly recommended.

Learning objectives

At the end of the course students are expected to

- Understand how the major aspects of food safety are regulated in EU law
- Recall the three components of the risk analysis principle and explain how they influence the legal approach to food safety
- Identify the laws related to food safety in the EU and describe their most relevant provisions
- Explain how these laws are enforced and who is responsible for their enforcement
- Identify the key actors of the food chain and outline their roles and responsibilities
- Understand the concepts of food business operator and liability
- Apply the legal perspective acquired in the lectures to real-life examples

Learning contents

The purpose of the course is to provide students with a well-rounded and interdisciplinary understanding of the legal and theoretical frameworks governing food safety and food safety-related risk management in the EU, illustrated by examples of its implementation in real-life situations.

The main topics include: the General Food Law and its most relevant provisions, the legal framework of food information within the EU (including labelling aspects and nutrition and health claims), and diverse additional EU food regulations on relevant topics, such as novel foods, GMOs, food contact materials, foods for specific groups, supplements, additives, (...)

Type and scope of the courses

Lecture (2 hours per week)

Tutorial (2 hours per week)

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Fak726895: Food Quality and Food Authenticity Law

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Purnhagen, Kai; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	1	5

Prerequisites

None

Learning objectives

At the end of the course students are expected to:

- Understand and define the concepts of food safety, food quality, and food authenticity, and differentiate between them
- Know the main regulatory framework for food quality and food authenticity in the EU
- Know the EU quality schemes for geographical indications and traditional specialties, as well as the EU organic framework
- Know about the administrative structure for implementing and supporting food quality and food authenticity in the EU
- Be able to conduct research and present findings on current topics related to food quality, food authenticity and sustainability regulation

Learning contents

The course offers students an introduction to key topics of food quality and food authenticity, in particular on labelling. The course is based on a research-based learning methodology and requires students to conduct small research project under the guidance of the tutors. Guest lecturers will be involved and excursions might take place.

Type and scope of the courses

Seminar (2 hours per week)

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Fak720430: Food Quality Management

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 45	Self-study hours (in hours) 105
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Fikar, Christian; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	3	3
Semester tasks	2	2

Prerequisites

None

Learning objectives

After completion of the course, students will understand key concepts of food quality management and are able to highlight their importance within the food industry. They are familiar with common tools and management concepts to improve performance and reduce error rates.

Learning contents

The course tackles:

- Introduction to food quality management
- Continuous improvement cycles
- Process modelling
- Statistical process control
- Lean management
- Risk management
- HACCP and GMP

Type and scope of the courses

Lecture (2 hours per week)

Seminar (1 hour per week)

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Fak720431: Food Supply Chain Management

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 45	Self-study hours (in hours) 105
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Fikar, Christian; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	3	3
Semester tasks	2	2

Prerequisites

None

Learning objectives

After completion of the course, students will understand key concepts of supply chain management and are able to highlight their importance within the food industry. They will be able to investigate various supply chain structures and develop concepts on how to improve transparency and coordination within such systems.

Learning contents

The course tackles:

- Introduction to food supply chains
- Supply chain drivers and metrics
- Supply chain network designs
- Demand forecasting
- Aggregated planning
- Supply chain coordination
- Uncertainty in food supply chains

Type and scope of the courses

Lecture (2 hours per week)
Seminar (1 hour per week)

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Fak726896: Research Seminar

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 15	Self-study hours (in hours) 75
Credit points (CP) 3	Frequency winter semester	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester tasks	1	3

Prerequisites

None

Learning objectives

Students will reflect their theoretical knowledge on the basis of the latest research in the field of the study programme. By critical reflection of the research works they will gain a better understanding how research contributes to transforming the current state of knowledge.

Learning contents

- Critically review of research outcomes
- Evaluate scientific evidence
- Improve discussion and presentation skills

Type and scope of the courses

Seminar (1 hour per week)

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Fak726897: Interdisciplinary Topics in Food Quality and Safety

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Fikar, Christian; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester tasks	1	5

Prerequisites

None

Learning objectives

Students can successfully conduct an interdisciplinary research project in the context of challenging interdisciplinary problems regarding food, nutrition and health in small groups and report on their findings upon completion of this course:

- Students are able to conduct research projects in an interdisciplinary setting.
- Students will be able to independently prepare and conduct research projects.
- Students can apply different methodologies to generate scientific findings from their research project.

Learning contents

The course offers food quality and safety students an insight into practical scientific work and better prepares them for their master's thesis by requiring students to work on an interdisciplinary research topic themselves. During this course, the students design their research project, they collect and analyse data, they present the research proposal at the interim presentation as well as final results at the end presentation, and they submit the first draft of the report and have to review the draft report of a companion group. The students have to comment on the suggestions for improvement from the peer review, how they have taken them into account in their work or why they have decided against them. This is done in the letter of response, which they submit together with the final version of the report. In this way, the students experience how a research process is carried out, which is close to the reality of a research project.

Type and scope of the courses

Project work and joint seminar

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Fak721985: Science Communication

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 60
Credit points (CP) 3	Frequency summer semester	Person responsible for the module Bartelmeß, Tina; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Essay	1	3

Learning objectives

Students acquire knowledge of the theoretical foundations of communicating science to the public. They deal with specialized scientific literature and prepare it for specific target groups. They develop and practice various strategies to reach target groups effectively. In addition, students acquire skills in writing texts and designing visual representations to effectively communicate scientific findings to the public.

Learning contents

- Perspectives of research on scholarly and science communication
- Target groups and their characterisation
- Models, theories and approaches of science communication
- Texts, visuals, types, media, and practices of science communication

Type and scope of the courses

Seminar (2 SWS)

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Fak726899: Research and Study Skills

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester tasks	1	5

Prerequisites

Use of reference management software (such as University used CITAVI)

Learning objectives

The students acquire detailed and differentiated knowledge about study skills and research design. This will include introduction in scientific writing, data visualisation and experimental design. Based on this knowledge, they will be able to design experiments in natural sciences and communicate science in an effective way.

Learning contents

- Introduction into research design: Experimental design, Interpretation of results
- Literature research
- Data visualisation
- Scientific writing
- Scientific poster and presentations
- Citation in scientific writing

Type and scope of the courses

Seminar (2 hours per week)

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Fak726898: Food Trade Law

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Purnhagen, Kai; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Term paper	1	5

Prerequisites

Introduction to Law and Food Law

Learning objectives

At the end of the course students are expected to

- Understand relevant international instruments pertaining to the international trade law area
- Apply the fundamental principles of the WTO framework
- Utilize the rules of major trade agreements
- Understand the complexities between international trade law, environment, agriculture, public health and intellectual property rights
- Understand finance related aspects that influence foreign trade and investment

Learning contents

This course offers an overview of Global Economic Law, with an emphasis on the food aspects. It will introduce students to the treaty architecture of the World Trade Organization (WTO) and certain other regional trade arrangements. Topics will include the historical, legal and regulatory rationale as well as political economy of the international trade framework, the relationship between international and domestic law and regulation in particular in the light of state arbitration and compliance issues, the standard-setting and the WTO dispute resolution system. Particular attention will also be directed to the Agreement on Technical Barriers to Trade and the Agreement on the Application of Sanitary and Phytosanitary Measures.

Type and scope of the courses

Lecture (2 hours per week)

Tutorial (2 hours per week)

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Fak324906: Impact Entrepreneurship – Developing Social and Ecological Innovations

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 45	Self-study hours (in hours) 135
Credit points (CP) 6	Frequency every semester	Person responsible for the module Jakob, Eva; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester tasks	1	6

The module examination consists of a presentation and the submission of a written solution concept.

Prerequisites

None

Learning objectives

The aim is to connect interdisciplinary master's students from all faculties and to enable them to jointly develop solutions for social and/or ecological problems using innovative methods. Examples of these are acute and global challenges such as biodiversity loss, climate change, environmentally friendly production/additive manufacturing, nutrition and smart cities.

By taking the course, sustainable, impact-oriented action can be experienced and solutions to global problems are developed. Through this course, you will not only learn a range of methods to address global challenges, but also develop a deeper understanding of these challenges, which is especially enhanced through interdisciplinary collaboration.

Learning contents

You will learn advanced knowledge in the field of impact entrepreneurship (i.e., solving social and/or ecological problems through innovative methods). Furthermore, you will learn how to develop your own sustainable solutions for social and/or ecological challenges. In addition to obtaining a foundation of scientifically based content on impact entrepreneurship, you will learn the necessary tools and their application in practice-oriented workshops and will also be personally advised in a team by the interdisciplinary lecturers.

Schedule:

1. Kick-off event (topic/problem presentation)
2. Interactive workshops (development of ideas/solutions, business models)
3. Independent further development of the project
4. Personal coaching (individual team advice)
5. Final presentations
6. Submission of the concept

Type and scope of the courses

Lectures, interactive workshops and personal coaching (3 hours per week)

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Fak726174: Advanced Genetics and Epigenetics

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Vlot-Schuster, Anna Cornelia; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	3	3
Semester tasks	2	2

Written exam about lecture content (60%)

Semester tasks (40%)

(Semester tasks include a written exercise and an experiment report.)

Prerequisites

For students of "Food System Sciences" prior attendance of the module 'Analytics in Life Sciences - from Molecules to Cells' is recommended.

Learning objectives

The students will develop an understanding of the intricate mechanisms of inheritance, including X-linkage, independent and coupled assortment of genes, genetic distance, epistasis, and other gene interactions. Also, students will gain in-depth knowledge about genomics, gene expression, and their relevance for recombinant DNA technology applications. The latter particularly includes new genomic techniques, i.e. CRISPR-Cas genome editing and derived applications. Further, students will understand epigenetic mechanisms that contribute to the regulation of gene expression and homeostasis and will learn approaches to study genetic and epigenetic aspects to organism-environment interactions and the prevention/development of (nutrition-associated) diseases.

Learning contents

The lecture will cover:

- Principles of genetics and genetic analysis, including Mendelian inheritance, single gene with and without X-linkage, human pedigree analysis, independent assortment of genes, gene coupling, genetic distance, inheritance in organelles, and epistasis
- Basic principles of genomics, transcriptomics, proteomics
- Gene expression regulation
- Recombinant DNA technology including CRISPR-Cas genome editing and derived applications (e.g. prime editing)
- Basic principles of epigenetic gene regulation
- Influence of epigenetics on organism-environment interactions
- Influence of epigenetics on prevention/onset of (nutrition-associated) disease

The seminar will include:

- Exercises to practise genetic analysis methods from the lectures, including Mendelian inheritance, single gene with and without X-linkage, human pedigree analysis, independent assortment of genes, gene coupling, genetic distance, inheritance in organelles, and epistasis.
- Exercises using online databases and/or -omics data
- CRISPR-Cas experimental design
- Half-day practical course providing hands-on experience with CRISPR-Cas genome editing in plant protoplasts

Type and scope of the courses

Lecture (2 hours per week)

Seminar/ laboratory practical (2 hours per week)

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Fak726335: Advanced Plant Breeding and Sustainable Food Production

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency summer semester	Person responsible for the module Vlot-Schuster, Anna Cornelia; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written or oral exam	3	3
Essay or presentation	2	2

Written exam on lecture content (60%)

Presentation (40%)

Prerequisites

Basic knowledge of genetics.

Prior completion of the following modules is recommended:

Analytix in Life Sciences – from molecules to cells (for FSS students), Crop Plant and Animal Biology (for FQS students) or Sustainable Food Production (Components and Production of Plant and Animal Foods, for GFNH students).

Learning objectives

The students acquire detailed and differentiated knowledge about plant breeding and its relevance to produce food.

Furthermore, they gain in-depth knowledge about modern genomic techniques, including RNAinterference and CRISPR-Cas genome editing, and their possible applications to plant production. Based on this knowledge, they can identify and optimize strategies to support the production of healthy food in the face of climate change.

Learning contents

Lecture content will apply the principles of Mendel's genetics to analyse conventional and modern plant breeding methods, including marker-assisted breeding. These will be reflected against advanced genomics and recombinant DNA technologies, including RNAinterference. Modern genomic techniques, including CRISPR-Cas genome editing and its derived applications (e.g. prime editing) will be introduced. Finally, repercussions of climate change will be discussed, focusing on both the quantity and quality of yield.

In the seminar students will apply and deepen their knowledge from the lectures in theoretical exercises, focusing on genetics, marker-assisted breeding, genomics, and CRISPR-Cas experimental designs. Students will further gain hands-on experience with a practical CRISPR-Cas exercise in the lab. Finally, students will present their experimental result and reflect it against dedicated articles from relevant plant breeding-related scientific literature, gaining insights into the state-of-the-art in plant breeding research.

Type and scope of the courses

Lecture (2 hours per week)

Seminar/ laboratory practical (2 hours per week)

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Fak730133: Advanced Skills in Food Quality and Safety I

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 15	Self-study hours (in hours) 45
Credit points (CP) 2	Frequency irregularly	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester-long tasks or presentation or essay or written exam	1	2

Prerequisites

none

Learning objectives

The course provides students with in-depth knowledge of current topics from various disciplines, and enables students to expand their expertise in food quality and safety.

Learning contents

Depending on the focus, students will generally develop a more in-depth understanding of the key principles of food quality and safety, as well as learning how to apply appropriate approaches or evaluate global challenges.

Type and scope of the courses

The teaching format varies depending on the topic and discipline of the course.

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Fak730134: Advanced Skills in Food Quality and Safety II

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 60
Credit points (CP) 3	Frequency irregularly	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester-long tasks or presentation or essay or written exam	1	3

Prerequisites

none

Learning objectives

The course provides students with in-depth knowledge of current topics from various disciplines, and enables students to expand their expertise in food quality and safety.

Learning contents

Depending on the focus, students will generally develop a more in-depth understanding of the key principles of food quality and safety, as well as learning how to apply appropriate approaches or evaluate global challenges.

Type and scope of the courses

The teaching format varies depending on the topic and discipline of the course.

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Fak730135: Advanced Skills in Food Quality and Safety III

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency irregularly	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester-long tasks or presentation or essay or written exam	1	5

Prerequisites

none

Learning objectives

The course provides students with in-depth knowledge of current topics from various disciplines, and enables students to expand their expertise in food quality and safety.

Learning contents

Depending on the focus, students will generally develop a more in-depth understanding of the key principles of food quality and safety, as well as learning how to apply appropriate approaches or evaluate global challenges.

Type and scope of the courses

The teaching format varies depending on the topic and discipline of the course.

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Fak729192: Coding & Data Science with Python for All

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Faisal, Aldo; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester-long tasks	1	5

Prerequisites

This is an introductory course. There is no prerequisite knowledge. However, participants should be comfortable with mathematics and engineering.

Learning objectives

After the module students will have gained:

- LO1: a good understanding of, and ability to use Python Programming Language effectively;
- LO2: the ability to design and access procedural and object-orientated programming structure in Python
- LO3: a fundamental understanding of Python standards, Data Science and Deep Learning libraries and how to appropriately select and apply them to solve a given programming problem;
- LO4: the ability to create, combine and complete relevant data science pre-processing steps;
- LO5: the ability to use standard Machine Learning algorithms to interact with Big Data.

Learning contents

Computer Programming has become one of the core-desirable skills within both academic and industrial settings. The versatility of modern computer languages, the abundance of data and a high-powered computational device led to swift progress in many fields of research and industry, especially in healthcare where rapid digitalisation allows research to be accomplished using computer simulation and machine learning.

The module aims to teach students the fundamentals of Computer programming and Data Science through one of the most popular Programming languages to its readability and Flexibility: Python. In this module the students will learn:

- Fundamentals of Programming in Python
- Core design philosophies and their differences (Procedural and Object Orientated)
- Common design patterns in Python
- Introduction to standard libraries
- Introduction to popular Data Science, Machine Learning and Deep Learning Libraries

Type and scope of the courses

- Lecture (2 hours per week)
- Exercise (2 hours per week)

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Fak726344: Current Issues in Nutritional Biochemistry and Immunology

Valid from: 01.10.2025

Teaching language English	Duration one semester	Contact hours (in hours) 68	Self-study hours (in hours) 82
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Henkel-Oberländer, Janin; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	3	3
Semester tasks	2	2

Prerequisites

Study program Food System Sciences: Prior participation in the modules 'Advanced nutritional biochemistry and physiology' and 'Advanced human physiology' is highly recommended.

Study program Food Quality and Safety: Prior participation in the module 'Nutritional Biochemistry, Physiology and Immunology' is highly recommended.

Learning objectives

The students acquire specific knowledge in the impact of nutrition in biochemical signalling and metabolic pathways. They understand the principles in immune response and can explain the organization of the immune system. Based on this knowledge, they are able to understand the role of food composition and lifestyle behavior in the context of human health and disease.

Learning contents

Lecture and seminar topics will include:

- principal function and molecules of the immune system
- impact of the innate and adaptive immune system and role of nutrition
- cell communication mechanisms, inflammatory response and development of metabolic diseases (e.g. MASLD and atherosclerosis)
- Molecular mechanisms of dietary components in the development of metabolic diseases (e.g. cholesterol, fructose)
- Nutritional regulation of gene expression

Practical lab course with cell culture experiments and application of biochemical and molecular biological methods

Type and scope of the courses

lecture and seminar (2 hours per week, could be organized as block only in the first half of the semester), practical work in the lab (2 x 3 full days during the semester)

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Fak726353: Current Issues in Sustainability and Production of Plant-based Foods

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Vlot-Schuster, Anna Cornelia; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester tasks	1	5

Prerequisites

Knowledge of molecular biology and genetics

Prior completion of either one or both of the modules Advanced Plant Breeding and Sustainable Food Production and/or Advanced Genetic and Epigenetics is recommended

Learning objectives

The students acquire detailed and differentiated knowledge about plant stress physiology, including (molecular) mechanisms related to plant stress tolerance and disease resistance. They will become able to reflect upon knowledge gaps and future challenges that are associated with the production of plant-based foods in the face of climate change. Based on this knowledge, they can develop (molecular) strategies to improve food production, identify bottlenecks, and analyse possible solutions.

Learning contents

Short lecture input will introduce the state-of-the-art in the field of plant physiology with a focus on the (molecular) mechanisms of plant stress tolerance and immunity. Further, in-depth discussions of recent scientific literature will support understanding of current and future challenges and opportunities to produce plant-based foods. Concomitantly, students will be guided to perform literature research, define own specific research questions, conceptualize approaches to address their research questions, and discuss recent research developments in plant molecular biology, physiology, and breeding focusing on innovative strategies to produce high-quality crops.

Type and scope of the courses

Lecture/seminar (4 hours per week)

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Fak729191: Digital Health for All

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 90
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Faisal, Aldo; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester-long tasks	1	5

Prerequisites

Students from all faculties with an interest in (digital) health

Learning objectives

Upon completion of the course, students should:

- Understand the fundamentals of the application of data-driven methods in medicine and health
- Gain a qualitative insight into the principles of artificial intelligence and how they serve as the cornerstone of digital health
- Gain a more detailed understanding of some concrete application examples in the field of digital health
- Be able to read and interpret scientific literature in this rapidly moving field.

Learning contents

This course provides students from any background with a fundamental understanding of digital healthcare, AI for medicine, and the literature in this field.

Topics covered include:

- Data Science & Data Engineering
- Wearables (Personal Digital Health)
- Telemedicine, eHealth, mHealth
- Electronic Health Record, Health Data and their use
- Integrated Care (Digital Public Health)
- Healthcare systems and their differences
- Design, Implementation, Evaluation of Digital Health, and Ethical Issues

Type and scope of the courses

Lecture (2 hours per week)

Exercise (2 hours per week)

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Fak729056: Future-oriented agricultural systems - Interdisciplinary perspectives on the agriculture of tomorrow

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 15	Self-study hours (in hours) 75
Credit points (CP) 3	Frequency irregularly	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Presentation	1	3

Prerequisites

none

Learning objectives

By the end of this lecture series, students will:

- understand current research approaches in interdisciplinary agricultural systems research, critically examine them and reflect on current debates on this topic.
- analyze the complex dimensions of future agricultural systems and grasp the systemic dimension of the transformation of agricultural systems,
- identify systemic challenges and innovation potential in the context of the agricultural and food transition and identify their intersections
- discuss and critically reflect on scientific contributions,
- derive interdisciplinary research approaches

Learning contents

- Different lectures from experts acting in the BMFTR funding line "Agricultural Systems of the Future" from various disciplines from universities and institutions outside the UBT.
- <https://agrarsysteme-der-zukunft.de/en/home>

Type and scope of the courses

lecture (1 hour per week)

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Fak728291: Innovative Food Products

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency irregularly	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Presentation	1	2.5
Essay	1	2.5

Prerequisites

none

Learning objectives

Students acquire knowledge of interdisciplinary issues relating to innovative food products. After completion of the course, students will know

- examples of innovative food product groups and have
- appropriate knowledge of the most important regulatory framework conditions
- and the acceptance and perception of food.

In addition, they can develop, understand, discuss and evaluate their own ideas/concepts for innovative food products and evaluate them.

Learning contents

The content of this module is based on current trends and developments in the field of innovative food. Topics include, for example

- Products made from alternative proteins
- Fitness, wellness and energy drinks
- Functional foods and superfoods

In addition, the relevant legal framework and current findings from consumer and behavioural research will be discussed.

Type and scope of the courses

seminar (2 hours per week)

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Fak729054: Interdisciplinary Lecture Series

Valid from: 01.10.2025

Teaching language English	Duration one semester	Contact hours (in hours) 15	Self-study hours (in hours) 45
Credit points (CP) 2	Frequency irregularly	Person responsible for the module Dorlach, Tim; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Essay	1	2

Prerequisites

none

Learning objectives

By the end of this lecture series, students will:

- Critically analyze how political frameworks, sociological dynamics, and interdisciplinary perspectives shape food systems, dietary patterns, and public health outcomes.
- Engage with and reflect on current academic debates related to nutrition, food policy, and sociology and other interdisciplinary perspectives.
- Develop the ability to formulate informed questions, connect insights across disciplines, and evaluate the broader social and political consequences of changing nutrition practices.
- Strengthen skills in academic communication through reflective writing, and active participation.

Learning contents

- Different lectures from experts from various disciplines from universities and institutions outside the UBT.
- The exact topic is redefined for each run.

Type and scope of the courses

lecture (1 hour per week)

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Fak729055: Practice in Nutrition Science Communication

Valid from: 01.04.2025

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Henkel-Oberländer, Janin; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester-long tasks	1	5

Script (40%) and podcast or video (60%)

Prerequisites

none

Learning objectives

The students acquire detailed and differentiated knowledge about communication with a focus on nutritional facts. This will include speech and voice training as well as social media training. Based on this knowledge, they will be able to design an idea for a podcast or video on nutritional facts.

Learning contents

- Introduction into research design (speech and voice training; social media training)
- Literature research
- Data visualisation
- Creating a podcast or a video

Type and scope of the courses

Seminar (2 hours per week)

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Fak726933: Science, law & society: Food innovations and alternative proteins

Valid from: 01.04.2024

Teaching language English	Duration one semester	Contact hours (in hours) 30	Self-study hours (in hours) 120
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Purnhagen, Kai; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written or oral exam	1	5

Learning objectives

The course is based on an interdisciplinary setting where students apply various methods from different fields to investigate the impact of regulatory frameworks on the case study of alternative proteins.

At the end of the course, students are expected to:

- define and identify different sources of alternative proteins
- possess adequate knowledge of the main regulatory frameworks applicable to alternative proteins on the global scene, with a specific focus on the European Union
- be able to reconnect the adoption of alternative proteins to the modern sustainability challenges
- be able to identify political and socio-economic issues behind the acceptance of alternative proteins in different countries and context
- understand how different political decisions and subsequent regulatory treatments can affect the development of food innovations.

Learning contents

The course provides students with an introduction to alternative proteins. The course covers the basic scientific aspects of alternative protein production. The course focuses explicitly on the relevance of alternative proteins for the sustainability transition of modern food systems.

Students will dive into the regulation and politics of alternative proteins, learning to identify political, environmental, and cultural reasons behind their promotion and/or rejection. Students will learn to assess the impact of different regulatory frameworks on the development of food innovations. The course will also highlight opportunities of collaboration with the global network of the Good Food Institute through the synergies with the Bayreuth-Kulmbach Alt Protein Society.

Type and scope of the courses

Seminar (2 SWS)

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Fak726901: Mandatory Internship (Praktikum)

Valid from: 01.04.2024

Teaching language German/English	Duration one semester	Contact hours (in hours) 0	Self-study hours (in hours) 360
Credit points (CP) 12	Frequency every semester	Person responsible for the module Schjeide, Brit-Maren; Dr.	

Assessments

Title:	Weighting:	CP:
Internship report	1	12

The module examination is not graded and is assessed on a pass/fail basis.

Prerequisites

None

Learning objectives

Students can apply their theoretical knowledge in practical activities or research and learn to train their soft skills through both autonomous endeavours and teamwork. Furthermore, students can independently reflect upon and professionalise their own competences.

Learning contents

Depending on internship place

Type and scope of the courses

Full-time internship of (at least) 9 weeks

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Fak722487: Master's Thesis – Food Quality and Safety

Valid from: 01.10.2021

Teaching language German/English	Duration one semester	Contact hours (in hours)	Self-study hours (in hours) 900
Credit points (CP) 30	Frequency every semester	Person responsible for the module All professors	

Assessments

Title:	Weighting:	CP:
Master's thesis	1	30

Prerequisites

It is recommended to have completed the modules from semesters 1-3

Learning objectives

Students acquire the ability to work independently on a comprehensive research question within a given period using scientific methods.

In addition to the technical competence required for this, students have further developed their methodological competence and self-competence in the process.

Learning contents

Formulating an adequate research question (topic identification), developing a concept, literature research, data collection and evaluation or literature and source analysis, writing a scientific thesis.

Type and scope of the courses

Independent research under supervision

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