UNIVERSITÄT BAYREUTH

LIFE SCIENCES
Food · Nutrition · Health

# Module Handbook

M5 b33 Food System Sciences
Faculty of Life Sciences: Food, Nutrition and Health
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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# Fak726151: Analytics in Life Sciences – from Molecules to Cells

Valid from: 01.10.2023

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 105 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 6 | winter semester | Baldermann, Susanne; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam | 1 | 3 |
| Semester tasks | 1 | 3 |

**Prerequisites**

none

**Learning objectives**

The students acquire knowledge on how cells function based on selected examples. Molecular interactions between the different components – from single molecules to multiple organelles – will be discussed. Additionally, students will deepen their knowledge about food composition and determine changes induced during storage or chemical interactions.
Using traditional analytical and biology techniques, students will look at individual classes of molecules and characterize specific targets in organelles and apply this knowledge to improve the nutritional quality of (plant-based) food.

**Learning contents**

The lecture will cover:
- The cellular mechanism and regulation of the formation of nutritionally relevant molecules
- Advanced knowledge about food composition
- Changes induced by storage and chemical interactions

The practical work will cover:
- Methods for the determination of specific molecular targets
- Advanced methods for the determination of nutritionally relevant molecules and signalling molecules

**Type and scope of the courses**

lecture (2 hours per week)
practical work in the lab (3 hours per week)

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# Fak726152: Nutritional Physiology – from Cells to Organisms

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 105 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 6 | winter semester | Haderer, Marika; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam | 1 | 3 |
| Semester tasks | 1 | 3 |

**Prerequisites**

none

**Learning objectives**

After completing this module, the students will be able to (i) delve into the intricate relationship between nutrition and physiology and (ii) explore how nutrients impact the functioning of cells, tissues, and the entire organism. Through interdisciplinary approaches, the students will gain a comprehensive understanding of nutritional biochemistry, metabolism, and physiology with emphasis on latest research to create a solid foundation for a career in nutrition, health sciences or related fields.

**Learning contents**

The lecture will cover:
- gastrointestinal tract anatomy
- Cellular nutrition
- Tissue- and organ-level physiology
- Nutritional biochemistry
- Nutritional genetics
- Nutritional epigenetics

The practical work will include:
- microscopy analysis
- protein digestion/quantification methods
- titration experiment

**Type and scope of the courses**

Lecture (2 hours per week)
Student-based Presentations + Practical work in the lab (3 hours per week)

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# Fak726153: Food Law – from National to International Perspectives

Valid from: 01.10.2023

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 6 | winter semester | Purnhagen, Kai; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam | 1 | 6 |

**Prerequisites**

none

**Learning objectives**

The students acquire detailed and differentiated knowledge
- to trace the historical development and evolution of the area of food law and its transformation to an integrated regime of international and national perspectives
- to identify and interpret key statutes and provisions and the underlying principles governing food safety, quality and trade at national, EU and international levels
- to recognize and analyse the relationship between national food laws and policies and European and international law
- to understand “law in action” by analysing landmark food law cases and disputes as well as current developments and challenges
- to develop basic legal thinking skills

Based on this knowledge, students are equipped with a basic understanding of the legal architecture governing food systems

**Learning contents**

The course offers a comprehensive overview of food law. It introduces students with its definition and scope and its nexus to public health, economic considerations, and global trade. Emphasis is placed on the evolving interplay between national and international regulations. The course introduces basic structures of European, international, and national institutions as well substantive rules governing food law.

**Type and scope of the courses**

Lecture (2 hours per week)
Tutorial (2 hours per week)

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# Fak726154: Bioeconomy – Sustainable Production, Business, and Society

Valid from: 01.10.2023

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 6 | winter semester | Fikar, Christian; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam | 1 | 6 |

**Prerequisites**

none

**Learning objectives**

After completion of the course, students have a basic knowledge on key concepts and challenges of the bioeconomy. A special focus is set on food systems and related processes. Consequently, students will be able to tackle key ideas on how to strengthen the connection between production, business, and society for a more sustainable future.

**Learning contents**

The course tackles:
- Introduction to Bioeconomy
- Plant-Based Bioeconomy
- Livestock-based Bioeconomy
- Sustainable Production
- Business Transformation
- Circular Economy
- Digital and Societal Transformations
- Corporate Social Responsibility

**Type and scope of the courses**

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

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# Fak726155: Study Skills, Science Communication, and Research Seminar

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 45 | 135 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 6 | winter semester | von Philipsborn, Peter; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Semester tasks | 1 | 6 |

**Prerequisites**

none

**Learning objectives**

After completion of the course, students can select and apply effective study and research methods and are aware of the practical foundations of communicating science to lay and (semi-)expert audiences and stakeholders using a variety of media. Further, students will know about key scientific concepts in the field of Food System Sciences.

**Learning contents**

The course covers the following topics:
- Generating and using evidence
- Principles of open science
- Introduction to literature search and reference management
- Basics of statistical analysis
- Introduction to science communication
- Core concepts in food systems science

The course includes practical applications of the above and a weekly rotation of scientific presentations by local and invited (guest) professors from research fields across the four specialisations in the M.Sc. programme Food System Sciences.

**Type and scope of the courses**

Lecture and seminar (2 SWS)
Faculty research seminar (1 SWS)

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# Fak726156: Advanced Analytics and Food Quality

Valid from: 01.10.2023

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Baldermann, Susanne; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written or oral exam | 2 | 2 |
| Semester Tasks | 3 | 3 |

**Prerequisites**

none

**Learning objectives**

The students will gain knowledge about state-of-the-art analytical technologies including mass spectrometry and the validation of methods and apply this knowledge in the practical lab course.

**Learning contents**

The course will cover:
- Advanced knowledge in chromatography
- Introduction into mass spectrometry
- Validation of analytical methods

**Type and scope of the courses**

Lecture (1 hour per week)
Practical work in the lab (4 hours per week)

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# Fak726172: Advanced Nutritional Biochemistry and Physiology

Valid from: 01.04.2026

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Haderer, Marika; Prof. Dr. |

**Assessments**

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

**Prerequisites**

Prior attendance of the module 'Nutritional physiology– from cells to organisms' is recommended

**Learning objectives**

The students acquire basic and specific knowledge in the control and regulation of energy and intermediary metabolism. They are able to describe the specific function of micronutrients in the human body in relation to metabolic diseases. At the end, the students are able to explain specific pathological outcomes and disease development in the context of human nutrition.

**Learning contents**

Lecture and seminar topics will include:
- Hormonal control and impact of nutrition: acute regulation of metabolism, hormonal regulatory circuits, local mediators
- Impact of micronutrients in health and disease
- Energy metabolism and interplay of organs
- Advanced liver metabolism and organ crosstalk
- Patho-biochemistry and patho-physiology: nutrition-related diseases

Practical lab course with biochemical, molecular biological and physiological methods

**Type and scope of the courses**

Lecture (2 hours per week)
Seminar and practical work in the lab (3 hours per week)

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# Fak726342: Current Issues in Analytical Sciences

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Römpp, Andreas; Prof. Dr. |

**Assessments**

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

**Prerequisites**

Knowledge of basic analytical chemistry
Prior participation in the module Advanced Analytics and Food Quality.

**Learning objectives**

The students deepen their knowledge about modern analytical techniques and apply this knowledge to develop strategies for the analysis of food composition and physiological effects. Furthermore, they know about the importance of study planning, sample preparation, data acquisition and analysis. They can develop strategies to answer food analysis questions.

**Learning contents**

Lectures will introduce current and future challenges and opportunities in analytical sciences. Students will further be guided to perform literature research, define own specific research questions, and discuss recent research developments in sample preparation protocols, separation techniques, spectroscopy and mass spectrometry and data analysis approaches.

**Type and scope of the courses**

Lecture: 1,4 hours per week
Seminar: 0,6 hours per week
Lab course: 3 hours per week

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# Fak726346: Current Issues in Biochemistry and Biotechnology of Microorganisms

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Lackner, Gerald; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written or Oral exam | 3 | 3 |
| Semester tasks | 2 | 2 |

**Prerequisites**

Basic knowledge of microbiology, molecular biology and biochemistry.
Practical experience in biology lab courses

**Learning objectives**

In this module, students will unlock the potential of microorganisms as microbial cell factories for the sustainable production of natural products. The course provides a comprehensive understanding of biosynthetic pathways, metabolic engineering, and enzyme design, along with an introduction to synthetic biology. Moreover, it encompasses the fundamental aspects of bioprocess engineering.

**Learning contents**

Lecture and seminar
- Biosynthesis of nutrients, vitamins and secondary metabolites
- Microbial bioprocess engineering
- Genetic manipulation of microbes
- Metabolic engineering
- Protein and enzyme engineering
- Synthetic microbiology

Laboratory course:
- Genetic engineering of microorganisms
- Production of bioactive compounds (e.g., vitamins, antibiotics)
- Enzyme production and analysis

**Type and scope of the courses**

Lecture/seminar (2 hours per week)
Laboratory course (3 hours per week)

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# Fak726343: Current Issues in Cellular Responses to External Cues

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 40 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Suhr, Frank; Prof. Dr. |

**Assessments**

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

**Prerequisites**

Knowledge of molecular biology
Prior completion of the module Advanced Nutritional Biochemistry and Physiology is recommended

**Learning objectives**

The students acquire detailed and differentiated knowledge about modern cell and molecular biology and its relevance to understand cellular responses to molecular food components. Furthermore, they know about the roles of food components in human health and disease. Based on this knowledge, they can develop (molecular) strategies to optimize the detection of food-associated health benefits.

**Learning contents**

Short lecture input will introduce current and future challenges and opportunities in cell and molecular biology. Students will further be guided to perform literature research, define own specific research questions, and discuss recent research developments in cell and molecular biology methods, signal transduction, and food-associated cellular effects on human physiology.

**Type and scope of the courses**

Lecture/seminar (2 hours per week)

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# Fak726173: Advanced Microbiology – Food Microbiology

Valid from: 01.04.2026

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 90 | 60 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Lackner, Gerald; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written oder Oral exam | 3 | 3 |
| Semester tasks | 2 | 2 |

**Prerequisites**

Basic knowledge of biology and chemistry
Basic practical experience in biology lab courses

**Learning objectives**

In this module, students will learn about the significant role of microbes in food production and safety. The course will also shed light on the profound impact of the microbiota on human health and nutrition. Through practical and theoretical instruction, participants will gain the ability to comprehend microbial processes in food production and hygiene measures critical in food processing.

**Learning contents**

Lecture:
- Microbial physiology
- Food spoilage
- Foodborne illness
- Food preservation / hygiene
- Microorganisms in food production
- Fermented and novel foods
- Microbiome in health and nutrition (e.g., probiotics and prebiotic)

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

Practical course:
- Microbiological examination techniques
- Detection of microorganisms in food
- Control of microbial growth (e.g., disinfection, antibiotics)
- Fermentation (e.g., yogurt production)

**Type and scope of the courses**

Lecture (2 hours per week)
Exercise (1 hour per week)
Laboratory course (3 hours per week)

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# Fak726174: Advanced Genetics and Epigenetics

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 90 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | 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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# Fak726175: Advanced Cell-Environment Interactions

Valid from: 01.10.2023

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Suhr, Frank; Prof. Dr. |

**Assessments**

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

**Prerequisites**

Prior attendance of the modules 'Analytics in Life Sciences - from Molecules to Cells' and 'Nutritional physiology– from cells to organisms' is recommended.

**Learning objectives**

The students can delve into the intricacies of cell—environment interactions, offering an in-depth exploration of cellular mechanisms that allow the cell/tissue to communication with its environment and vice versa. The focus will be on cutting-edge research concepts to develop a comprehensive understanding of cell—environment interplay, which is fundamental to understand organismal health and disease development.

**Learning contents**

The lecture will cover i.a.:
- Concepts of cell—environment interactions
- Mechanophysiology of striated muscles and nuclear membranes
- Mechanophysiology and its implications in diseases
- Tumor microenvironments
- Physical properties of the extracellular matrix
- Mechanisms of cell adhesion
- Methods for measuring cell adhesion

The seminar will cover:
- Guided development of scientific talk preparations, poster developments and journal club

**Type and scope of the courses**

Lecture (2 hours per week)
Seminar (3 hours per week)

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# Fak726176: Advanced Human Physiology

Valid from: 01.10.2023

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Suhr, Frank; Prof. Dr. |

**Assessments**

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

**Prerequisites**

Prior attendance of the module 'Nutritional physiology– from cells to organisms' is recommended

**Learning objectives**

The student can delve deeply into the intricacies of molecular human physiology, offering an in-depth exploration of the physiological mechanisms governing human health, disease and aging. The focus will be on cutting-edge research concepts to develop a comprehensive understanding of human physiology at multiple levels to prepare students for careers in research, healthcare and related fields.

**Learning contents**

The lecture will cover:
- Concepts of molecular and cellular human physiology
- Advanced physiology of multiple organ systems
- Cellular and molecular mechanisms of aging
- Cellular and molecular mechanisms of disease development

The practical work will cover:
- Cellular, molecular, and biochemical methods

**Type and scope of the courses**

Lecture (2 hours per week)
Seminar and practical work in the lab (3 hours per week)

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# Fak726335: Advanced Plant Breeding and Sustainable Food Production

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 90 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | 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:
Analytics 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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# Fak726344: Current Issues in Nutritional Biochemistry and Immunology

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 68 | 82 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | 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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# Fak726345: Current Issues in Human Nutrition in Health and Disease

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Haderer, Marika; Prof. Dr. |

**Assessments**

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

written exam (60%), semester tasks via presentation and lab report (40%)

**Prerequisites**

Prior participation in the modules 'Advanced nutritional biochemistry and physiology' and 'Advanced human physiology' is recommended.

**Learning objectives**

This cutting-edge course focuses the most current and relevant topics in the fields of human nutrition and the related health—disease interplay. The student will explore basic knowledge in cell death mechanisms, recent research, emerging trends, and contemporary issues in these areas, gaining an in-depth understanding of how human nutrition impacts overall health but also disease developmemt and prevention in case of cancer, inflammatory bowel disease and neurodegenerative disease especially. The course aim is to prepare the student for careers in research, healthcare and (molecular) nutrition sciences.

**Learning contents**

The lecture will cover:
- cell death mechanisms of cell death and their detection methods
- Cancer development, prevention, and therapy under the influence of nutrition
- Chronic Inflammatory Bowel Diseases and their modulation by nutrition
- Intestinal barrier integrity and its assessment methods
- Neurodegenerative diseases and the role of nutrition in cellular health
- Chrononutrition, Gender-specific nutritional needs and personalized nutrition approaches

The practical component emphasizes cell culture techniques and apoptosis detection to apply molecular and biochemical methods in nutrition-related research

**Type and scope of the courses**

Lecture (2 hours per week)
practical work in the lab (3 hours per week)

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# Fak726347: Current Issues in Cellular, Organismal, and Exercise Physiology/Biology

Valid from: 01.04.2024

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 75 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Suhr, Frank; Prof. Dr. |

**Assessments**

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

**Prerequisites**

Prior participation in the modules 'Advanced nutritional biochemistry and physiology' and 'Advanced human physiology' is recommended.

**Learning objectives**

This cutting-edge course focuses the most current and relevant topics in the fields of cellular biology, organismal physiology, and exercise physiology. The student will explore recent research, emerging trends, and contemporary issues in these areas, gaining an in-depth understanding of how cellular and physiological processes impact overall health, fitness and performance under health and disease. The course aim is to prepare the student for careers in research, healthcare and (molecular) exercise sciences.

**Learning contents**

The lecture will cover:
- Latest research and advancements in cellular biology, organismal physiology, and exercise physiology
- integration of cellular processes into whole-body physiological responses
- molecular mechanisms underlying exercise-induced adaptations
- Relations to health, disease and aging

The practical work will cover:
- Cellular, molecular, and histological methods

**Type and scope of the courses**

Lecture (2 hours per week)
Seminar and practical work in the lab (3 hours per week)

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# Fak721264: Global Political Economy of Food

Valid from: 01.04.2026

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Dorlach, Tim; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam or semester tasks | 1 | 5 |

**Learning objectives**

Students acquire a basic understanding of the political and economic processes that shape the world food system and global food security. Based on this knowledge, they are able to analyze current developments in global food governance and evaluate pertinent reform proposals.

**Learning contents**

- Structure and Development of the World Food System
- Institutions and Actors of Global Food Governance
- Reform Options for Global Food Governance

**Type and scope of the courses**

Lecture (2 hours per week)

**Literature:**

Literature recommendation:
Paarlberg, R. (2023). Food Politics: What Everyone Needs to Know (3rd ed.). Oxford University Press. (ebook available via the library)
Clapp, J. (2020). Food (3rd ed.). Polity. (various physical copies available in the library)

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# Fak726337: Advanced Institutional and Substantive EU Food Law

Valid from: 01.04.2024

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

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam | 1 | 5 |

**Prerequisites**

Prior participation in the module “Food law– from national to international perspectives” is recommended.

**Learning objectives**

The students acquire detailed and differentiated knowledge
- to demonstrate an in-depth understanding of the European institutional framework governing food law by distinguishing functions of different institutions and the interplay as well as balancing of legislative, administrative and judicial decision-making
- to assess the principles governing competencies of the EU in the area of food law against the background of their historical and political development
- to evaluate the interplay between EU law and national legislative and administrative procedures
- to develop an in-depth understanding of interpretation and application of different substantive rules of EU food law ranging from treaty provisions (e.g. market freedoms) to secondary legislation (e.g. basic regulation, labelling law, novel food regulation; GMO directive, hygiene package)
- to recognize the basic structure of the external powers of the EU and its relevance to food law
- to critically analyse landmark cases in EU food law and assess their impact on regulation and industry

Based on this knowledge, students are equipped with a detailed understanding of the EU-legal architecture governing food systems

**Learning contents**

The course offers an in-depth analysis of the institutional and substantive foundations of EU food law. The course is divides into two thematic blocks. It starts with analyses of the legal design of different institutions in the regulatory framework of EU-Food Law, emphazising the relationship between general and special institutions such as the EFSA. The second block is concerned with the substantive structures and specifics of EU food law

**Type and scope of the courses**

lecture (2 hours per week)
tutorial (2 hours per week)

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# Fak726338: Advanced Institutional and Substantive International Food Law

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 90 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Purnhagen, Kai; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam | 1 | 5 |

**Prerequisites**

Prior participation in the module “Food law– from national to international perspectives” is recommended.

**Learning objectives**

The students acquire detailed and differentiated knowledge
- to demonstrate an in-depth understanding of the institutional framework governing international food law by distinguishing functions and the design of international bodies like the WTO, FAO and the Codex Alimentarius Commission as well as international human rights bodies
- to understand the foundations and limits of peaceful dispute settlement mechanisms in international law
- to develop an in-depth understanding of interpretation and application of different substantive rules of international food law ranging from general trade agreements (e.g. GATT) to specific trade and nontrade related regimes (e.g. TBT and SPS, TRIPS, Cartagena Protocol, human rights)
- to understand the complexities between international trade law, environment, agriculture, public health and intellectual property rights
- to recognize and assess the challenge of fragmentation of international law

Based on this knowledge, students are equipped with a detailed understanding of the International legal rules governing food systems

**Learning contents**

The course offers an in-depth analysis of the institutional and substantive foundations of International food law. The course is divided into two thematic blocks. It starts with analyses of the legal design of different institutions in the regulatory framework of international food law. The second block is concerned with the substantive structures and specifics of International food law

**Type and scope of the courses**

Lecture (2 hours per week)
Tutorial (2 hours per week)

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# Fak726348: Current Issues in Food and Health Policy

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Dorlach, Tim; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam or semester tasks | 1 | 5 |

**Prerequisites**

none

**Learning objectives**

Depending on the chosen course.

**Learning contents**

Courses that can be chosen in this module include:
- Food Security in Africa (course number: 70500, instructor: Maryanne Wamahiu)

**Type and scope of the courses**

Depending on the chosen course.

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# Fak726349: Current Issues in European and International Food Trade Economic(s) Law

Valid from: 01.04.2024

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Purnhagen, Kai; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Term paper | 3 | 3 |
| Presentation | 2 | 2 |

**Prerequisites**

Prior participation in the modules Advanced institutional and substantive EU food law and Advanced institutional and substantive international food law

**Learning objectives**

The students acquire detailed and differentiated knowledge
- to analyse major challenges and issues in the field of food law and their economic impact
- to recognize emerging trends influencing the development of food law policies (e.g. climate change; technological impact such as digital traceability or genetically modified organisms; heightened obesity rates)
- to further deepen the understanding of complexities between international trade law, environment, agriculture, public health and intellectual property rights
- to further understand “law in action” by analysing current food trade law cases in the context of EU and international law

**Learning contents**

The course identifies and analyses current issues of European and international food trade economic(s) law.

**Type and scope of the courses**

Seminar (2 hours per week)

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# Fak726350: Current Issues in European and International Environmental Law

Valid from: 01.04.2024

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Grosche, Nils; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Term paper | 3 | 3 |
| Presentation | 2 | 2 |

**Prerequisites**

Advanced institutional and substantive EU food law and the module advanced institutional and substantive international food law

**Learning objectives**

The students acquire detailed and differentiated knowledge
- to analyse major challenges and issues in the field of environmental law
- to recognize the complexities of legally balancing different aspects of economic development and protection of the environment as well as the underlying transnational dimension of many environmental challenges
- to understand the need of EU and international environmental law to address the specific role of scientific uncertainty and to adapt to environmental changes
- to further understand “law in action” by analysing current environmental cases in the context of EU and international law

**Learning contents**

The course identifies and analyses current issues of European and international environmental law.

**Type and scope of the courses**

Seminar (2 hours per week)

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# Fak726336: Seminar Entrepreneurship and Innovation

Valid from: 01.04.2026

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 90 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Preller, Rebecca; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Presentation (100%) | 1 | 5 |
| Presentation (50%) | 1 | 2.5 |
| Semester tasks (50%) | 1 | 2.5 |

The module examination consists of either a presentation (100%) or a portfolio examination with two examinations: presentation (50%) and semester tasks (50%).

**Prerequisites**

none

**Learning objectives**

At the end of the seminar the students will be able to:
- understand the difference between idea, business opportunities, invention, and innovation;
- evaluate opportunities for business ideas and apply business concepts by prototyping,;
- evaluate business ideas and identify business opportunities;
- segment and analyse markets;
- evaluate own business idea with the help of customer feedback, observations from stakeholders, and interviews;
- identify a real customer problem and create customer benefit with ideas for a solution.
- understand effectual entrepreneurship;
- understand basic economic terms, such as Intellectual Property, Cashflow, Venture Capital, Controlling;
- understand Design Thinking methodology

**Learning contents**

In a creative atmosphere, students learn to develop and present a business idea to solve a customer problem. For that purpose, a startup pitch is developed. During the course following topics are discussed.
- Fundamentals of innovation
- Business model
- Consumer and consumer value
- Assessment of business ideas
- Market & competition
- Pitching business ideas
- Presentation practice: customer, customer value, market USP
- Forming powerful business teams
- Fundamentals on protection of intellectual property

**Type and scope of the courses**

The seminar will be offered in a blocked format to facilitate project-oriented learning and teamwork.

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# Fak726340: Advanced Business Analytics

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 45 | 105 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Fikar, Christian; Prof. Dr. |

**Assessments**

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

Written exam and semester tasks

**Prerequisites**

Prior participation in the module 'Bioeconomy – sustainable production, business, and society' is recommended.

**Learning objectives**

After completion of the course, students are able to use advanced business analytics concepts to analyse common and well-defined decision-making problems in the context of the bioeconomy. The focus is set on topics related to food supply chain management and decision-making in highly uncertain and dynamic settings.

**Learning contents**

The course tackles:
- Mathematical Optimization
- Metaheuristics
- Simulation
- Data and Process Mining
- Predictive Analytics

**Type and scope of the courses**

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

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# Fak726341: Advanced Theories in Food Studies

Valid from: 01.10.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Bartelmeß, Tina; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Written exam or Essay | 1 | 5 |

**Prerequisites**

none

Literature recommendations for preparation:
- Murcott, A. (2019). Introducing the sociology of Food & Eating. London, New York: Bloomsbury Academic.
- Zhen, W. (2019). Food Studies: A Hands-On Guide. Bloomsbury Academic.

**Learning objectives**

In this module, students explore the social and cultural aspects of food. The students acquire knowledge about social science theories of food and nutrition. Based on this knowledge, students are able to identify social structures and cultural norms that influence food habits in real-life contexts. Furthermore, students are able to explain how food sociology can help to conceptualise the connections between individual food habits and wider social patterns. Finally, students are able to recognize the importance of food in the development of identities, cultures, group dynamics, symbolism, communication, and other sources of meaning in human life.

**Learning contents**

- Sociological Perspectives on Food & Nutrition
- Socio-ecological model of food behaviour
- Food & Identity
- Food & Migration
- Food in the Media & Digital Food Cultures
- Transforming Food Cultures

**Type and scope of the courses**

lecture and accompanying seminar (2 SWS)

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# Fak726351: Current Issues in Business Analytics

Valid from: 01.04.2024

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | Fikar, Christian; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Essay | 3 | 3 |
| Presentation | 2 | 2 |

**Prerequisites**

Successful completion of module 'Bioeconomy – sustainable production, business, and society'

**Learning objectives**

After completion of the course, students are able to independently analyse complex decision-making settings and unstructured data. Furthermore, they can use this input to develop and implement business analytics methods to improve decision-making within the bioeconomy.

**Learning contents**

Students work on various current issues in the context of business analytics and the bioeconomy motivated by real industry cases or settings of high relevance to research. The students are presented a complex decision-making problem and corresponding input data. Afterwards, students develop tools and test the developed methods for their performance.

**Type and scope of the courses**

Seminar (2 hours per week)

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# Fak726352: Current Issues in Food Studies

Valid from: 01.04.2026

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 30 | 120 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | summer semester | Bartelmeß, Tina; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Term paper | 3 | 3 |
| Presentation | 2 | 2 |

**Prerequisites**

basic knowledge on the linkages of food, nutrition, health, and climate change

**Learning objectives**

Climate change affects our food system and our food system has a fundamental impact on the climate. Raising awareness of these connections and promoting transformations is currently a significant challenge for food studies. In this module, students acquire detailed and differentiated knowledge of theories, strategies, and methods of climate change communication. Furthermore, they know successful strategies of public engagement for food and health-related challenges of climate change and are able to develop their own creative communication approaches.

**Learning contents**

- Climate change communication research: theories, strategies, approaches
- Factors that influence public understanding of climate change
- Food, nutrition, and health in the context of climate change
- Innovative climate change communication approaches and strategies

**Type and scope of the courses**

seminar (2 SWS)

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

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | one semester | 60 | 90 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 5 | winter semester | 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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# Fak726354: Research Seminar Food System Sciences

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| English | two semesters | 15 | 75 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 3 | every semester | Vlot-Schuster, Anna Cornelia; Prof. Dr. |

**Assessments**

| Title: | Weighting: | CP: |
|---|---|---|
| Semester tasks | 1 | 3 |

The portfolio examination includes the compulsory attendance of seminars by invited speakers (submission requirement: one-sentence summaries of each talk) and a 20-minute presentation of own scientific work (a progress report held during or after the M.Sc. thesis research).

**Prerequisites**

It is highly recommended to start this module not earlier than the third semester of study.

**Learning objectives**

Students can reflect upon and extend their theoretical knowledge in research seminars held by scientists and other professionals working in Food System Sciences. They will further gain a better understanding of the state-of-the-art and of how research contributes to transforming the state-of-the-art in the fields of their respective Food System Sciences specialisations. Furthermore, students will train their presentation and discussion skills in own presentations to an expert audience.

**Learning contents**

The module includes a research seminar with guest speakers: professionals who present their work as to their peers, providing a high level of actuality, scientific depth, and presentation skills. Additionally, the module hosts presentations by the students themselves, in which they present (part of) their M.Sc. thesis research to other students and to scientific and teaching staff on campus.

**Type and scope of the courses**

Seminar (1 hour per week)

**Notes**

The responsible contact person for this module is Dr. Kathrin Paulus-Tremel (kathrin.paulus-tremel@uni-bayreuth.de).

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# Fak726355: (Research) Internship

Valid from: 01.04.2025

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| German/English | one semester | 0 | 360 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 12 | every semester | Suhr, Frank; Prof. 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 research or related practical activities and learn to train their research as well as their soft skills through autonomous endeavours and teamwork. Furthermore, students can independently reflect upon and professionalise their own competences.

**Learning contents**

The Internship is part of the specialisation part of the Food System Sciences study program. For this reason, the content/topic should be associated with the chosen specialisation of each individual student. Internships can be carried out either at chairs of the University of Bayreuth or externally (in agreement with a University-internal supervisor). Internship content may be chosen to deepen your understanding of topics that are related to your specialisation or to orient yourself on the prospective job market that is associated with your specialisation.

**Type and scope of the courses**

Full-time internship of at least 9 weeks or two full-time internships of at least 4,5 weeks each

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# Fak726357: Master's Thesis – Food System Sciences

Valid from: 01.04.2024

| Teaching language | Duration | Contact hours (in hours) | Self-study hours (in hours) |
|---|---|---|---|
| German/English | | 0 | 900 |

| Credit points (CP) | Frequency | Person responsible for the module |
|---|---|---|
| 30 | every semester | 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/hypothesis, 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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