
Module Handbook

Food System Sciences 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.

Table of Contents

Alphabetical index can be found on page 40

A: Inter-/transdisciplinary Competences

Fak726151: Analytics in Life Sciences – from Molecules to Cells (26S)	4
Fak726152: Nutritional Physiology – from Cells to Organisms (26W)	5
Fak726153: Food Law – from National to International Perspectives (23W)	6
Fak726154: Bioeconomy – Sustainable Production, Business, and Society (27S)	8
Fak726155: Study Skills, Science Communication, and Research Seminar (26W)	9

B/C: Specialisation

I: Analytics in Life Sciences

I - B: Specialisation - Electives (at least 15 CP)

Fak726156: Advanced Analytics and Food Quality (26S)	11
Fak726172: Advanced Nutritional Biochemistry and Physiology (27S)	15
Fak726173: Advanced Microbiology – Food Microbiology (26S)	16
Fak726174: Advanced Genetics and Epigenetics (27S)	17
Fak726175: Advanced Cell-Environment Interactions (27S)	18

I - C: Specialisation

Fak726342: Current Issues in Analytical Sciences (26S)	12
Fak726346: Current Issues in Biochemistry and Biotechnology of Microorganisms (25W)	13
Fak726343: Current Issues in Cellular Responses to External Cues (26W)	14

II: Nutritional Physiology

II - B: Specialisation - Electives (at least 15 CP)

Fak726172: Advanced Nutritional Biochemistry and Physiology (27S)	15
Fak726173: Advanced Microbiology – Food Microbiology (26S)	16
Fak726174: Advanced Genetics and Epigenetics (27S)	17
Fak726175: Advanced Cell-Environment Interactions (27S)	18
Fak726176: Advanced Human Physiology (27S)	19
Fak726335: Advanced Plant Breeding and Sustainable Food Production (27S)	31

II - C: Specialisation

Fak726344: Current Issues in Nutritional Biochemistry and Immunology (27S)	20
Fak726345: Current Issues in Human Nutrition in Health and Disease (26W)	21
Fak726347: Current Issues in Cellular, Organismal, and Exercise Physiology/Biology (26W)	22

III: Food Law

III - B: Specialisation - Electives (at least 15 CP)

Fak726336: Seminar Entrepreneurship and Innovation (26S)	23
Fak721264: Global Political Economy of Food (26W)	24
Fak726337: Advanced Institutional and Substantive EU Food Law (26S)	25
Fak726338: Advanced Institutional and Substantive International Food Law (25S)	26

III - C: Specialisation

Fak726348: Current Issues in Food and Health Policy (26W)	28
Fak726349: Current Issues in European and International Food Trade Economic(s) Law (24S)	29
Fak726350: Current Issues in European and International Environmental Law (26S)	30

IV: Bioeconomy

IV - B: Specialisation - Electives (at least 15 CP)

Fak726335: Advanced Plant Breeding and Sustainable Food Production (27S)	31
Fak726336: Seminar Entrepreneurship and Innovation (26S)	23
Fak721264: Global Political Economy of Food (26W)	24
Fak726340: Advanced Business Analytics (26W)	32
Fak726341: Advanced Theories in Food Studies (27S)	33

IV - C: Specialisation

Fak726351: Current Issues in Business Analytics (26W)	34
Fak726352: Current Issues in Food Studies (26W)	35
Fak726353: Current Issues in Sustainability and Production of Plant-based Foods (26W)	36

D: Professional competences across specialisations

Fak726354: Research Seminar Food System Sciences (25S)	37
Fak726355: (Research) Internship (26W)	38

E: Master's Thesis

Fak726357: Master's Thesis – Food System Sciences (24S)	39
---	----



Fak726151: Analytics in Life Sciences – from Molecules to Cells

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 105
Credit points (CP) 6	Frequency winter semester	Person responsible for the module Baldermann, Susanne; Prof. Dr.	

Assessments

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

Prerequisites

none

Learning objectives

Students develop a solid understanding of the primary molecular components found in biological systems and foods, such as carbohydrates, lipids, proteins, vitamins and secondary plant metabolites. They also become familiar with the key analytical strategies employed to characterize these compounds and investigate biological processes at molecular and cellular levels.

Learning contents

This course introduces the chemical composition of foods and plants, with a focus on major and minor constituents, including carbohydrates, proteins, lipids, vitamins, minerals, and bioactive compounds. In addition to their structure, occurrence, and biological functions, the course covers the fundamental biosynthetic pathways underlying the formation and accumulation of these compounds in plant and food systems, providing insight into the metabolic processes that determine food composition and quality.

There is also a particular focus on instrumental analytical methods, especially mass spectrometry. Alongside classical approaches, the course covers the principles of ionisation, mass analysers and detection systems, as well as coupling techniques such as liquid chromatography–mass spectrometry (LC–MS) and gas chromatography–mass spectrometry (GC–MS). Using selected examples, the analysis of food constituents, including amino acids, peptides, lipids, phenolic compounds, vitamins, metabolites and contaminants, is demonstrated. In this context applications in food authentication and quality control are discussed.

Moreover, students are also introduced to fundamental principles in cell biology and biochemistry, including DNA, RNA, and protein structure and function as well as the regulation of gene expression. Methods for their analysis, including fluorescence microscopy, the polymerase chain reaction (PCR), gel electrophoresis, and reverse transcriptase-quantitative PCR are discussed.

The laboratory course provides practical training in the analysis of specific molecular targets (DNA/RNA/gene expression) and introduces advanced analytical approaches for the characterization of nutritionally relevant biomolecules. In addition to learning practical skills in the lab, students learn to generate, evaluate, and interpret analytical data from food and life science applications.

Type and scope of the courses

lecture (2 hours per week)

Practical work in the lab (3 hours per week)

[go to Table of Contents](#)



Fak726152: Nutritional Physiology – from Cells to Organisms

Valid from: 01.10.2026

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 105
Credit points (CP) 6	Frequency winter semester	Person responsible for the module Holzapfel, Christina; 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 have developed a comprehensive understanding of the intricate relationship between nutrition and physiology. They will know the reference values of energy, macronutrients and micronutrients and will be able to explore how nutrients impact the functioning of organs and the entire organism, and how nutrition contribute to the maintenance of health and the development of diseases. In addition, life cycle nutrition is also a key component of this module.

Through interdisciplinary approaches, the students will gain a comprehensive understanding of nutritional biochemistry, metabolism, genetics, and physiology. Furthermore, they will gain insights into the molecular and physiological mechanisms underlying nutrient utilization and metabolic regulation over the course of life. Students will be able to critically evaluate current scientific findings and will apply knowledge to nutrition-related questions in research and practice. The module provides a solid foundation for a career in nutrition research, health sciences or related fields.

Learning contents

The lecture will cover:

- Gastrointestinal tract anatomy
- Tissue- and organ-level physiology
- Metabolism and reference values of energy and macronutrients (protein, carbohydrates, fat)
- Metabolism and reference values of micronutrients (vitamins, trace elements, minerals)
- Nutritional epigenetics and genetics
- Life cycle nutrition: metabolism and reference values e.g. in pregnancy, lactation period, childhood and adolescents, older adults)

The seminar will cover:

- Standard operating procedures for lab work (experimental design, analytical techniques, lab-based results)
- Standard operating procedures for human intervention studies (e.g. study design, data collection, clinical results, ethics)

The practical work will include:

- Microscopy analysis
- Protein digestion/quantification methods
- Titration experiment

The module provides an in-depth introduction to the physiological and molecular principles of human nutrition. The overview of gastrointestinal tract anatomy also includes digestion, absorption and transport of nutrients. Principles of cellular nutrition and tissue- and organ-level physiology complement the lecture. In addition, dietary recommendations, key metabolic pathways and physiological regulation of nutrition metabolism over the course of life are introduced. Aspects of nutritional genetics and epigenetics will show the interactions between nutrients and the genetic background of a person and how these factors influence nutrient requirements and metabolic responses. Throughout the module, current research findings are integrated. The practical work includes standard operating procedures for lab work and human intervention studies as well as fundamental laboratory methods in nutritional physiology. Microscopy-based analyses of biological samples, techniques for the digestions and quantification of proteins will be performed. There will be also a gain of knowledge in collection, analysis and interpretation of laboratory data.

Type and scope of the courses

Lecture (2 hours per week)

Student-based assignments + Practical work in the lab (3 hours per week)

[go to Table of Contents](#)



Fak726153: Food Law – from National to International Perspectives

Valid from: 01.10.2023

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 120
Credit points (CP) 6	Frequency winter semester	Person responsible for the module Purnhagen, Kai; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Written exam	1	6

Prerequisites

none

Learning objectives

Upon successful completion of the course, students will have acquired a detailed and differentiated introductory understanding of the development, structure and functioning of food law. They will be able to trace the historical evolution of food law and its transformation from predominantly national regulation into an integrated legal field shaped by national, European and international perspectives.

Students will be able to identify and interpret key legal provisions and underlying principles governing food safety, food quality and food trade at national, European and international levels. They will understand the relationship between national food laws and policies and the broader European and international legal framework, including the interaction between different levels of regulation and the institutions responsible for their implementation.

Students will further develop an understanding of law in action by analysing landmark food law cases and disputes, as well as current regulatory developments and challenges. Through the application of legal rules to concrete cases, they will acquire basic legal thinking skills, including the identification of relevant legal issues, the interpretation and systematic application of legal provisions, and the structured assessment of competing legal interests.

The competencies acquired in the module provide an essential foundation for students' further academic and professional development. By combining knowledge of the legal architecture of food systems with basic skills in legal analysis, interpretation and case-based problem-solving, the module enables students to approach regulatory questions systematically and to communicate legally substantiated assessments. These competencies are relevant to professional activities in legal practice, public administration, regulatory affairs, policy-making, research and the food industry, particularly where activities involve the interpretation and application of food law across different regulatory levels.

Upon completion of the course, students will thus possess a basic but coherent understanding of the legal architecture governing food systems and will be equipped to engage with more advanced legal and interdisciplinary questions in the field of food law.

Learning contents

The course provides a comprehensive introduction to food law and its legal, institutional and regulatory foundations. It introduces students to the definition, scope and functions of food law and examines its close relationship with public health, economic considerations and global food trade.

The course traces the historical development of food law and highlights its transformation into an increasingly integrated field of regulation shaped by national, European and international legal frameworks. Particular emphasis is placed on the evolving interaction between these levels of regulation and on the ways in which European and international law influence the development and application of national food law.

The course introduces the basic institutional structures of national, European and international food law, as well as the principal substantive rules and legal principles governing food safety, food quality and food trade. Landmark cases and disputes, together with selected current developments and regulatory challenges, are used to illustrate the practical operation of food law and to introduce students to law in action.

Through this combination of institutional, substantive and case-based perspectives, the course provides students with the foundations necessary to understand the legal architecture governing modern food systems.

Type and scope of the courses

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

[go to Table of Contents](#)



Fak726154: Bioeconomy – Sustainable Production, Business, and Society

Valid from: 01.04.2027

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 120
Credit points (CP) 6	Frequency winter semester	Person responsible for the module 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, from a business, social and life science perspective. A special focus is set on food systems and related interdependent processes by taking a systems thinking perspective. Students will get familiar with common software, methods and databases used in the context of bioeconomy.

Consequently, after completion of the module, students will be able to tackle key ideas on how to strengthen the connection between production, technology, business, and society for more sustainable decision-making in their future career as a key actors in the bioeconomy.

Learning contents

The course tackles:

- Introduction to Bioeconomy
- Introduction to Systems Thinking
- Societal Dimensions of the Bioeconomy
- Communication in the Bioeconomy
- Basics in Agriculture
- Primary Production and Sustainable Production
- Fermentation
- Microbial Biotechnology
- Circular Economy

Type and scope of the courses

Lecture (2 hours per week)

Seminar (2 hours per week)

[go to Table of Contents](#)



Fak726155: Study Skills, Science Communication, and Research Seminar

Valid from: 01.10.2026

Teaching language English	Duration one semester	Contact hours (in hours) 60	Self-study hours (in hours) 120
Credit points (CP) 6	Frequency winter semester	Person responsible for the module von Philipsborn, Peter; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Semester tasks	1	6

To pass the course, a so-called Semester Task ("Semesterbegleitende Aufgabe" in German) has to be completed - this is an assignment consisting of several tasks to be completed at home and submitted via the e-learning platform. Further information will be provided in the course.

Prerequisites

None

Learning objectives

The overarching goal of the course is to provide you with essential, foundational skills required for your studies, most of which are also of high relevance in many professions you may work in after your studies. This includes technical and practical skills (e.g., data analysis, literature search, reference management) as well as conceptual skills (e.g., a basic understanding of statistics, evidence generation and use, and open science, and key concepts in food systems science, policy and practice).

Learning contents

The course covers the following topics:

- Basic study skills: How to study effectively and efficiently
- An evidence-based approach to food systems sciences: Generating and using evidence
- Searching for academic literature
- Organizing and citing references with EndNote
- Principles of open science
- Basics of statistics and data analysis
- Introduction to complex systems science & key concepts in food systems science
- An introduction to laboratory work in biology and food sciences

Mastering these skills will enable you to make the most of your studies, and to excel in your job in food systems science, be it as a researcher, in industry or as a government official.

Type and scope of the courses

Seminar (4 SWS)

Literature:

For an introduction to statistics, a great online learning resource are the statistical videos produced by Justin Zeltzer that are available on this website: www.zstatistics.com/videos

For an introduction to current debates around food systems, the website Our World in Data is a useful resource, providing data and background information on various topics around global, regional and national food systems. Interesting pages include:

- Roser M, Ritchie H, Rosado P: Food Supply. Online: <https://ourworldindata.org/food-supply>
- Ritchie H, Rosado P, Roser M: Environmental Impacts of Food Production. Online: <https://ourworldindata.org/environmental-impacts-of-food>
- Ritchie H, Roser M: Land Use. Online: <https://ourworldindata.org/land-use>
- Ritchie, H: Yields vs. land use: how the Green Revolution enabled us to feed a growing population. Online: <https://ourworldindata.org/yields-vs-land-use-how-has-the-world-produced-enough-food-for-a-growing-population>
- Ritchie H, Rosado P, Roser M: Hunger and Undernourishment. Online: <https://ourworldindata.org/hunger-and-undernourishment>

Relevant podcasts and online lecture series on food systems topics include:

- Online lectures from the Centre for Food Policy at the City University of London: <https://www.youtube.com/@centreforfoodpolicy109>
- The Food Systems Podcast from the TABLE network: <https://feed.buzzsprout.com/>
- The World Food Programme's "Better Food. Better World" podcast: <https://www.wfp.org/podcast-better-food-better-world>
- Episodes on food and alternative proteins from the Positive Climate Podcast: <https://www.apositiveclimate.com/categories/food-and-alternative-proteins/>
- Episodes on factory farming from the 80,000 Hours Podcast: <https://80000hours.org/topic/world-problems/factory-farming-world-problems/?content-type=podcast>

The following journal articles provide introductory, foundational readings on the global food system:

- Tilman D, Clark M: Global diets link environmental sustainability and human health. *Nature* 2014; 515: 518-22.
- Branca F, Lartey A, Oenema S, Aguayo V, Stordalen GA, Richardson R, Arvelo M, Afshin A: Transforming the food system to fight non-communicable diseases. *BMJ* 2019, 364:l296.
- Rutter H, Savona N, Glonti K, Bibby J, Cummins S, Finegood DT, Greaves F, Harper L, Hawe P, Moore L, et al: The need for a complex systems model of evidence for public health. *The Lancet* 2017, 390:2602-2604.
- Willett W, Rockström J, Loken B, et al.: Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems. *The Lancet* 2019; 393: 447-92.

[go to Table of Contents](#)



Fak726156: Advanced Analytics and Food Quality

Valid from: 01.04.2026

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 Baldermann, Susanne; Prof. Dr.	

Assessments

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

Prerequisites

none

Learning objectives

Students will develop a comprehensive understanding of the principles of method development, optimisation and validation in food analysis, and learn to critically evaluate the performance characteristics of analytical methods. The course places a particular focus on advanced mass spectrometry-based techniques for characterising and quantifying food constituents. Upon successfully completing the course, students will be able to design analytical workflows and validate analytical methods according to quality criteria.

Learning contents

This course provides an in-depth understanding of the advanced analytical approaches employed in modern food science and quality assessment. Students will be introduced to the principles of quality assurance for analytical methodologies, including method development, calibration strategies, validation procedures, measurement uncertainty and the statistical evaluation of analytical data. Selected case studies demonstrate the application of mass spectrometry in quality assessment.

The practical element of the course provides hands-on training in advanced mass spectrometric techniques and analytical method validation. Students will perform experiments involving sample preparation, operating instruments, acquiring data, and evaluating data. Particular emphasis is placed on developing and validating analytical methods, including assessing performance parameters such as linearity, accuracy, precision, limits of detection and quantification, and method robustness.

Type and scope of the courses

Lecture (1 hour per week)

Practical work in the lab (4 hours per week)

[go to Table of Contents](#)



Fak726342: Current Issues in Analytical Sciences

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 75
Credit points (CP) 5	Frequency winter semester	Person responsible for the module 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 is recommended.

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. Students can assess and evaluate the quality of analytical measurement data. This enables them to work in an analytical laboratory and to interpret literature studies (e.g. for metadata analysis) as part of a job in industry, academia or the public sector.

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. In the lab course students will perform spectroscopic and mass spectrometric experiments.

Type and scope of the courses

Lecture: 1,4 hours per week

Seminar: 0,6 hours per week

Lab course: 3 hours per week

[go to Table of Contents](#)



Fak726346: Current Issues in Biochemistry and Biotechnology of Microorganisms

Valid from: 01.10.2025

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 75
Credit points (CP) 5	Frequency winter semester	Person responsible for the module 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

Upon successful completion of the module, students will be able to explain how microorganisms can be used as microbial cell factories for the sustainable production of food components, food enzymes, and bioactive natural products. They will be able to describe and compare relevant fermentation processes, including traditional, biomass, and precision fermentation. Students will be able to apply basic principles of genetic engineering to recombinant protein production in microbial hosts and to describe fundamental strategies for protein purification and analysis. They will be able to apply principles of enzyme biochemistry to analyze and interpret biochemical data and to describe approaches for protein and enzyme engineering. In addition, students will be able to explain fundamental principles of bioprocess engineering and relate them to the development of sustainable microbial production processes. The knowledge and skills acquired in this module prepare students for professional activities in industrial and food biotechnology, particularly in the development, optimization, and analysis of microbial production processes for enzymes, food ingredients, and bioactive compounds.

Learning contents

Lecture

- Traditional fermentation in food production
- Biomass and precision fermentation for food production
- Microbial biosynthesis of nutrients and food enzymes
- Genetic engineering and recombinant protein/enzyme production in microbial hosts
- Protein/enzyme purification and analytical methods
- Food enzymes and fundamentals of enzyme biochemistry
- Protein and enzyme engineering
- Fundamentals of bioprocess engineering and fermentation technology

Seminar:

During the seminar, concepts introduced in the lecture are deepened through exercises and case studies and applied using relevant software tools.

Laboratory course:

- Genetic engineering of microorganisms
- Microbial production of bioactive compounds (e.g. vitamins and antibiotics)
- Production, purification, and biochemical analysis of enzymes

Type and scope of the courses

Lecture + seminar (2 hours per week)

Laboratory course (3 hours per week)

[go to Table of Contents](#)



Fak726343: Current Issues in Cellular Responses to External Cues

Valid from: 01.10.2026

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

Assessments

Title:	Weighting:	CP:
Semester tasks	1	5

Prerequisites

Knowledge of molecular biology and human nutrition

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, students will be able to critically assess current concepts and methodologies in nutrition research and apply them to the investigation of food-associated effects on human health. Furthermore, they will be able to develop (molecular) strategies to optimize the detection of food-associated health benefits. The knowledge and practical skills gained in this module will prepare students for future careers in biomedical and life sciences research, biotechnology, pharmaceutical and healthcare-related fields, as well as for further academic development through research-oriented postgraduate study and PhD programs.

Learning contents

Lecture and seminar will cover:

- Cell death
- Immunology
- Genetics in observational and clinical studies
- Methods in molecular biology (polymerase chain reaction)
- Mechanisms and consequences of aging

Short lecture input will introduce current and future challenges and opportunities in cell and molecular biology and in clinical research. An overview of future perspectives and methodological advances in the field will be provided. Furthermore, the translation of cellular and molecular findings into human studies and clinical practice is part of the module. For instance, the mechanisms of aging and cell death as well as genetics are combined with the introduction of molecular techniques like qPCR and genome sequencing. Students will further be guided to perform literature research, define own specific research questions, and analyze a scientific data set. They discuss recent research developments in cell and molecular biology methods, signal transduction, and food-associated effects on human physiology. Through guided presentations and discussion, students develop the ability to critically analyze scientific literature. The module combines theoretical knowledge with research-oriented learning.

Type and scope of the courses

Lecture/seminar (3 hours per week)

[go to Table of Contents](#)



Fak726172: Advanced Nutritional Biochemistry and Physiology

Valid from: 01.04.2027

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 Holzapfel, Christina; 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 in humans. They will understand the complex interactions between nutrients, hormones, and metabolic pathways that maintain physiological homeostasis under healthy and pathological conditions. Students are able to describe the specific function of micronutrients in the human body in relation to metabolic health and diseases. At the end, the students are able to explain specific pathological outcomes and disease development in the context of human nutrition. By integrating concepts from physiology, biochemistry and nutrition, students will develop the ability to critically assess current scientific findings and to apply it to questions in nutrition sciences. The module provides an advanced knowledge for professional careers in nutrition research, health sciences or related fields.

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
- Patho-biochemistry and patho-physiology: nutrition-related diseases

Practical work will include:

- Biochemical, molecular biological and physiological methods

This module provides a detailed understanding of nutrition physiology and biochemistry with focus on mechanisms that regulate metabolism and maintain physiological function. Furthermore, hormonal control of metabolism and the influence of nutritional factors on metabolic regulations are addressed. With a focus on micronutrients in human health and disease, students will explore the physiological functions of vitamins, minerals, and trace elements and examine how deficiencies, imbalances and altered utilization contribute to the development of diseases. The module also addresses energy metabolism. Pathobiochemistry and pathophysiology of nutrition-related diseases are content of the lectures. Furthermore, the role of nutrition in disease prevention and management is discussed.

Through experimental lab work, students gain practical skills in the investigation of metabolic processes, the analysis of physiological responses, and the application of laboratory techniques relevant in human intervention studies.

Type and scope of the courses

Lecture (2 hours per week)

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

[go to Table of Contents](#)



Fak726173: Advanced Microbiology – Food Microbiology

Valid from: 01.04.2026

Teaching language English	Duration one semester	Contact hours (in hours) 90	Self-study hours (in hours) 60
Credit points (CP) 5	Frequency summer semester	Person responsible for the module 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

Upon successful completion of the module, students will be able to explain the roles of microorganisms in food production, food spoilage, and food safety. They will be able to describe major food-borne pathogens with regard to their sources, growth requirements, routes of transmission, and relevant virulence factors, and to explain basic methods for their detection, identification, and control. Students will also be able to apply selected microbiological techniques for the detection and identification of microorganisms and to interpret the resulting data. Students will understand the biochemical principles underlying food fermentation. The knowledge and practical skills acquired in this module prepare students for professional activities in food production, quality assurance, food safety, and microbiological analysis.

Learning contents

Lecture:

- Microbial physiology
- Microorganisms in food production
- Fermented foods
- Food spoilage
- Foodborne illness
- Food preservation / hygiene
- 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., Kefir production)

Type and scope of the courses

Lecture (2 hours per week)

Exercise (1 hour per week)

Laboratory course (3 hours per week)

[go to Table of Contents](#)



Fak726174: Advanced Genetics and Epigenetics

Valid from: 01.04.2027

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. For students of "Food Quality and Safety" prior attendance of the module "Crop Plant and Animal Biology" is recommended.

Learning objectives

The students will develop an understanding of the intricate mechanisms of the inheritance of traits in human pedigrees and will gain in-depth knowledge of genomics, gene expression, and 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 how genetic and epigenetic aspects influence organism-environment interactions and the prevention/development of (nutrition-associated) diseases.

After completion of the module, students have gained knowledge that (i) enables the consideration of genetic and epigenetic aspects in health-related consulting activities and (ii) enhances their efficiency in scientific projects using molecular biology applications in health research.

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 traits, gene linkage, genetic distance, inheritance in organelles, and epistasis. The lecture further covers basic principles of whole genome sequencing, transcriptomics and gene expression analysis as well as CRISPR-Cas genome editing and derived applications (e.g. prime editing). In the final third of the lecture, content focuses on basic principles of epigenetic gene regulation, the influence of epigenetics on organism-environment interactions, and the influence of epigenetics on prevention/onset of (nutrition-associated) disease.

The seminar includes exercises to practise genetic analysis methods from the lectures, exercises using online databases and -omics data, CRISPR-Cas experimental design, and a 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)

[go to Table of Contents](#)



Fak726175: Advanced Cell-Environment Interactions

Valid from: 01.04.2027

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 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 communicate 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. Particular attention will be given to the role of mechanical forces and physical properties of the cellular microenvironment in regulating cell and tissue function. The students will also explore how alterations in these interactions contribute to pathological processes, including tissue dysfunction and tumor development. Through the discussion of current research findings, they will gain insights into experimental approaches used to investigate these complex biological processes.

Learning contents

The course explores the principles of cell–environment interactions, with a focus on the mechanophysiology of striated muscles and nuclear membranes and its relevance to human disease. Topics include tumor microenvironments, the physical properties of the extracellular matrix, mechanisms of cell adhesion and experimental methods for measuring cell adhesion. The seminar component provides guided training in the preparation and presentation of scientific talks and posters, as well as the critical discussion of scientific literature through journal clubs.

Students will develop an integrated understanding of how mechanical and physical cues within the cellular microenvironment influence cell and tissue function. Emphasis will be placed on connecting fundamental concepts with current research findings and on developing the ability to critically evaluate and communicate scientific evidence. The knowledge and skills gained in this module will prepare students for future careers in biomedical research, biotechnology, tissue engineering, regenerative medicine and related fields. It will also provide a strong foundation for further academic development, including research-oriented postgraduate study and PhD programs.

Type and scope of the courses

Lecture (2 hours per week)

Seminar (3 hours per week)

[go to Table of Contents](#)



Fak726176: Advanced Human Physiology

Valid from: 01.04.2027

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 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. Particular emphasis will be placed on understanding the molecular and cellular processes underlying physiological adaptation and dysfunction. Students will explore how alterations in these processes contribute to the development and progression of human diseases and age-related changes. Through the integration of current research findings, students will develop the ability to critically evaluate physiological mechanisms and their relevance to health and disease.

Learning contents

The lecture will cover fundamental concepts of molecular and cellular human physiology, with a focus on the advanced physiology of multiple organ systems. Particular emphasis will be placed on the cellular and molecular mechanisms underlying aging and disease development. The practical component will introduce students to a range of cellular, molecular and biochemical methods, providing hands-on experience with experimental approaches used to investigate physiological and pathological processes. Students will learn to connect experimental findings with fundamental physiological concepts and critically interpret scientific data. The knowledge and practical skills gained in this module will prepare students for future careers in biomedical and life sciences research, biotechnology, pharmaceutical and healthcare-related fields, as well as for further academic development through research-oriented postgraduate study and PhD programs.

Type and scope of the courses

Lecture (2 hours per week)

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

[go to Table of Contents](#)



Fak726344: Current Issues in Nutritional Biochemistry and Immunology

Valid from: 01.04.2027

Teaching language English	Duration one semester	Contact hours (in hours) 78	Self-study hours (in hours) 72
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: Successful participation in the modules 'Advanced nutritional biochemistry and physiology' and 'Advanced human physiology' is highly recommended.

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

Learning objectives

The students can explain the organization of the immune system and understand the principles in the innate and adaptive immune response. They acquire specific knowledge in cellular communication and biochemical signalling pathways as well as their relation to immunity. Based on this knowledge, the students are able to understand the role of food components and lifestyle behavior in the context of human health and disease. This module qualifies students for careers in nutrition and health sciences, biomedical and clinical research, the food, pharmaceutical and biotechnology industries, as well as diagnostic laboratories and public health organizations by providing a solid foundation in immunology, cellular communication, and molecular biological methods.

Learning contents

Lecture and seminar topics include basic concepts in immunology, principles of innate and adaptive immunity, recognition of microbes and damages cells, cellular components and soluble effector molecules in innate immunity, the inflammatory response, stimulation of adaptive immunity, regulation and limitation of the innate immune response, impact of diet in the development of metabolic diseases with focus on steatotic liver diseases, cell communication by inflammatory mediators (cytokines, chemokines, lipid-derived signalling molecules and their signalling cascades) as well as the impact of insulin resistance and hyperinsulinemia of inflammatory processes. In addition, there will be a lecture summarizing methods in molecular biology and a 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 weeks with 2 half and 2 full days during the semester)

[go to Table of Contents](#)



Fak726345: Current Issues in Human Nutrition in Health and Disease

Valid from: 01.10.2026

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 75
Credit points (CP) 5	Frequency winter semester	Person responsible for the module Holzapfel, Christina; 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 students will understand the complex interactions between nutritional factors, cellular processes, and disease development. Students will explore basic knowledge in cell death mechanisms, recent research, emerging trends, and contemporary issues in these areas. They get to know the mandatory steps in human intervention studies and they make first experiences to generate study hypotheses and to develop a concept for a human intervention study. In addition, students know dietary assessment methods and are able to understand the implementation in research and practice due to their strengths and limitations. Students gain an in-depth understanding how to interpret human intervention studies in regard to clinical relevance for the prevention and treatment of diseases. The critical evaluation of current literature and research findings is also aim of the module. The course aim is to prepare the student for careers in research, healthcare and nutrition sciences.

Learning contents

The lecture will cover:

- Cell death mechanisms and their detection methods
- Human intervention studies: from the idea to the final data set (e.g. hypothesis, study design, intervention, data collection, ethical vote)
- Dietary assessment in research and clinical practice (e.g. diet diary, food frequency questionnaires, 24h-recall, malnutrition questionnaires)
- Nutrition recommendations and therapy in selected diseases (e.g. cancer, chronic inflammatory bowel diseases)
- Dietary and medical guidelines for the treatment of nutrition-related diseases

The practical work will include:

- Cell culture techniques (Western plot)
- Dietary assessment approaches (e.g. diet diary)

This module addresses current topics and challenges in the field of human health and nutrition and provides students with an understanding of the relationships between nutritional factors, human physiology, and disease development. A particular focus is on the application of research methods in both experimental and clinical settings. The lecture introduces mechanisms of cell death. In addition, the module provides an overview of the design and implementation of human intervention studies. Students learn how nutritional research questions are translated into scientific study concepts, including hypothesis generation, study design, intervention planning, data collection, data management, and ethical approval procedures. In addition, the course introduces methods of dietary assessment used in research and in clinical practice. Students gain insight into the strengths and limitations of approaches such as dietary records, food frequency questionnaires, 24-hour dietary recalls, and screening tools for malnutrition. The module also examines nutritional recommendations and therapeutic strategies for selected diseases, including cancer and chronic inflammatory bowel diseases. Dietary and medical guidelines for the prevention and treatment of nutrition-related diseases complement the course. The practical work combines laboratory work with nutritional assessment methods. The use and evaluation of dietary assessment tools in research and clinical practice is part of the practical work.

Type and scope of the courses

Lecture (2 hours per week)

practical work in the lab (3 hours per week)

[go to Table of Contents](#)



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

Valid from: 01.10.2026

Teaching language English	Duration one semester	Contact hours (in hours) 75	Self-study hours (in hours) 75
Credit points (CP) 5	Frequency winter semester	Person responsible for the module 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 on 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 conditions of health and disease. The course aims to prepare the student for careers in research, healthcare and (molecular) exercise sciences. Particular emphasis will be placed on the integration of cellular and systemic mechanisms to understand physiological adaptation to exercise and the development of disease. Students will critically engage with current scientific literature and research findings, strengthening their ability to evaluate evidence and relate fundamental biological mechanisms to practical and clinical contexts. Through this interdisciplinary approach, the course will foster scientific thinking and provide a foundation for understanding emerging developments in cellular and exercise sciences.

Learning contents

The lecture will cover the latest research and advancements in cellular biology, organismal physiology and exercise physiology, with a focus on integrating cellular processes into whole-body physiological responses. Particular emphasis will be placed on the molecular mechanisms underlying exercise-induced adaptations and their relevance to health, disease and aging. The practical component will introduce students to a range of cellular, molecular and histological methods used to investigate physiological and pathological processes. Students will gain hands-on experience with experimental approaches and develop the ability to relate experimental findings to current concepts in cellular and exercise physiology. The knowledge and practical skills acquired in this module will prepare students for future careers in biomedical and life sciences research, exercise and sports science, biotechnology, pharmaceutical and healthcare-related fields. The module will also provide a strong foundation for research-oriented postgraduate study and PhD programs in physiology, cell biology, exercise science and related disciplines.

Type and scope of the courses

Lecture (2 hours per week)

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

[go to Table of Contents](#)



Fak726336: Seminar Entrepreneurship and Innovation

Valid from: 01.04.2026

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 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.

[go to Table of Contents](#)



Fak721264: Global Political Economy of Food

Valid from: 01.10.2026

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 Dorlach, Tim; Prof. Dr.	

Assessments

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

Prerequisites

none

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, students are able to analyze current developments in global food governance and evaluate pertinent reform proposals, which prepares them for positions in food policy-making and consulting and related fields.

Learning contents

The course "Global Political Economy of Food" provides students with a broad overview of the institutions that shape the world food system. It adopts a global political economy perspective to analyze the development of global food governance. We study intergovernmental institutions like the World Food Programme and the World Trade Organization as well as nongovernmental actors like the Rockefeller Foundation and La Vía Campesina. We explore the roles and limitations of these and other institutions through case studies of concrete global food governance issues, such as agricultural subsidies, international food aid and genetically modified crops.

Type and scope of the courses

Lecture (2 hours per week)

Literature:

Literature recommendations:

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)

[go to Table of Contents](#)



Fak726337: Advanced Institutional and Substantive EU Food Law

Valid from: 01.04.2026

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 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.

The module prepares students for professional roles at the interface of food systems and regulation, including regulatory affairs, compliance, and policy analysis in businesses, public institutions, and non-governmental organisations.

Learning contents

The course offers an in-depth analysis of the institutional and substantive foundations of EU food law. The module examines advanced aspects of EU food law, including nutrition and health claims, foods for specific groups, food fortification, food supplements, and the challenges of harmonising nutrition labelling. It explores the role of fundamental rights in EU food law, public enforcement through official controls and emergency management, and the liability of EU institutions and Member States. It also addresses the legal requirements and controls governing food imports and the framework for the EU's external trade relations.

Type and scope of the courses

lecture (2 hours per week)

tutorial (2 hours per week)

[go to Table of Contents](#)



Fak726338: Advanced Institutional and Substantive International Food Law

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 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

Upon successful completion of the course, students will have acquired a detailed and differentiated understanding of the institutional and substantive foundations of international food law. They will be able to explain and critically assess the functions, competences and regulatory structures of key international institutions, including the World Trade Organization (WTO), the Food and Agriculture Organization of the United Nations (FAO), the Codex Alimentarius Commission and relevant international human rights bodies.

Students will understand the foundations, functioning and limits of peaceful dispute settlement mechanisms in international law and will be able to apply relevant procedural and substantive rules to disputes arising in the context of international food regulation. They will develop an in-depth understanding of the interpretation and application of the principal legal regimes governing international food law, ranging from general trade disciplines, in particular the General Agreement on Tariffs and Trade (GATT), to specific trade- and non-trade-related regimes, including the Agreements on Technical Barriers to Trade (TBT), Sanitary and Phytosanitary Measures (SPS) and Trade-Related Aspects of Intellectual Property Rights (TRIPS), as well as the Cartagena Protocol on Biosafety and relevant international human rights instruments.

Building on this knowledge, students will be able to identify and critically assess the complex interrelationships between international trade law, environmental protection, agriculture, public health and intellectual property rights. Particular attention is given to the challenges arising from the fragmentation of international law and the interaction of different legal regimes, institutions and regulatory objectives. Students will thus be equipped to analyse concrete regulatory problems in a structured manner and to evaluate competing legal and policy considerations.

Upon completion of the course, students will possess a comprehensive understanding of the international legal framework governing food systems and will be able to analyse its institutional structures, substantive rules and practical interaction across different fields of international law.

Learning contents

The course provides an in-depth analysis of the institutional and substantive foundations of international food law. It examines the international legal framework governing food systems and focuses on the interaction of the different institutions and legal regimes that shape the production, regulation and international trade of food.

The course is divided into two thematic blocks. The first block examines the institutional architecture of international food law. It addresses the legal design, functions and competences of key international institutions and regulatory bodies, including the WTO, FAO, Codex Alimentarius Commission and relevant human rights bodies. It further considers the foundations and limitations of peaceful dispute settlement mechanisms in international law.

The second block focuses on the substantive structures and specific legal regimes of international food law. It covers the rules governing international trade in food and agricultural products, including the GATT and the TBT, SPS and TRIPS Agreements. It further addresses the relevance of environmental and biosafety law, in particular the Cartagena Protocol on Biosafety, as well as international human rights law for the regulation of food systems. Particular emphasis is placed on the tensions and synergies between trade liberalisation, environmental protection, agricultural interests, public health and intellectual property rights.

The course concludes by addressing the fragmentation of international law and its implications for the coherent regulation and governance of global food systems.

Type and scope of the courses

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

[go to Table of Contents](#)



Fak726348: Current Issues in Food and Health Policy

Valid from: 01.10.2026

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 Dorlach, Tim; Prof. Dr.	

Assessments

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

Current course in this module: "School Food Systems" (Prof. Dr. Tim Dorlach)

Prerequisites

Previous completion of the course "Global Political Economy of Food" is recommended.

Learning objectives

The course "School Food Systems" enables students to acquire a detailed understanding of the science, policies and politics of school food systems around the world. Based on this knowledge, students are able to analyze current developments in school food policy and formulate policy recommendations for strengthening school food systems, which prepares them for positions in school food policy-making and consulting and related fields.

Learning contents

The course "School Food Systems" examines school food systems from an international comparative perspective. School meal programs, which are at the center of most school food systems, can have significant multisectoral benefits, for instance by improving children's food security, incentivizing school enrollment and attendance, and supporting local agricultural development. Students will comprehensively explore the school food systems of Finland, Japan, Brazil, and Ghana, with a particular focus on issues such as universal provision, food education, and local procurement. Building on the analysis of these global models, students will conduct detailed case study research on other countries' school meal programs and wider school food systems.

Type and scope of the courses

Seminar (2 hours per week; blocked during first half of the semester)

Literature:

Literature recommendation:

Morgan, K., & Sonnino, R. (2013). The school food revolution: public food and the challenge of sustainable development. Routledge.

[go to Table of Contents](#)



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

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:
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" is recommended.

Learning objectives

Upon successful completion of the course, students will have acquired detailed and differentiated knowledge enabling them to analyse major challenges and current developments in European and international food trade law and to assess their economic implications. They will be able to identify emerging trends that shape the development of food law and regulatory policies, including climate change, technological developments such as digital traceability and genetically modified organisms, and increasing rates of obesity and their implications for food regulation and public health.

Building on their prior knowledge, students will further deepen their understanding of the complex interrelationships between international trade law, environmental protection, agriculture, public health and intellectual property rights. Particular emphasis is placed on the interaction between legal, economic, technological and societal developments and on their implications for the design and implementation of food law.

Students will further develop their understanding of law in action by analysing current cases and regulatory developments in European and international food trade law. They will learn to apply relevant legal frameworks to concrete regulatory and economic problems, critically assess competing interests and regulatory approaches, and develop structured and legally sound solutions.

The competencies acquired in the module contribute directly to students' professional development. By combining legal analysis with economic assessment, interdisciplinary problem-solving and the application of law to current regulatory challenges, the module equips students with competencies relevant to professional activities in legal practice, public administration, policy-making, regulatory affairs, international organisations, research and the food industry. In particular, students develop the ability to independently analyse complex regulatory issues, assess their economic and societal implications, critically evaluate competing policy options and communicate legally substantiated assessments in an interdisciplinary and international context.

Learning contents

The course identifies and analyses current issues in European and international food trade economic law. It focuses on contemporary regulatory challenges at the intersection of food law, international trade and economic policy and examines their implications for the regulation of food systems.

Particular attention is given to current developments driven by climate change, technological innovation and public health concerns. The course addresses, inter alia, the regulatory implications of digital traceability, genetically modified organisms and changing patterns of food consumption and obesity. These developments are considered in their European and international legal context, with a focus on the interaction between trade regulation and other relevant areas of law, including environmental, agricultural, public health and intellectual property law.

The course adopts a case- and problem-oriented approach. Current cases, regulatory developments and policy debates are analysed to illustrate the practical operation of European and international food trade law and to enable students to critically assess the economic and regulatory consequences of different legal approaches.

Type and scope of the courses

Seminar (2 hours per week)

[go to Table of Contents](#)



Fak726350: Current Issues in European and International Environmental Law

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 winter semester	Person responsible for the module Grosche, Nils; Prof. Dr.	

Assessments

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

Prerequisites

Prior attendance in the modules "Advanced Institutional and Substantive EU Food Law" and "Advanced Institutional and Substantive International Food Law" is recommended.

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

The module prepares students for professional roles at the interface of food systems, environmental governance, and sustainability, including policy analysis, regulatory affairs, and environmental compliance in businesses, public institutions, and non-governmental organisations.

Learning contents

The module examines current issues in European and international environmental law, drawing on its legal frameworks, institutional actors, and core principles. Through selected cases, it explores climate change, the use and protection of water resources, environmental pollution, transboundary movements of hazardous waste, and corporate accountability. Particular attention is paid to human rights and environmental litigation, the transnational dimensions of environmental challenges, and legal responses to scientific uncertainty and tensions between environmental protection and economic development.

Type and scope of the courses

Seminar (2 hours per week)

[go to Table of Contents](#)



Fak726335: Advanced Plant Breeding and Sustainable Food Production

Valid from: 01.04.2027

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:

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

Learning objectives

The students acquire detailed and differentiated knowledge about plant breeding and its relevance for food production. They gain in-depth knowledge about hybridization, including F1-hybrid technology, and marker-assisted breeding. Furthermore, students acquire knowledge and practical experience using modern genomic techniques, including CRISPR-Cas genome editing. Finally, students become acquainted with sustainable crop production strategies as alternatives to conventional production methods.

After successful completion of the module, students become enabled to join plant breeding efforts, including research and development to support the production of food in a sustainable manner.

Learning contents

Lecture content will apply the principles of Mendelian genetics to analyse conventional and modern plant breeding methods, including hybridization and marker-assisted breeding. These will be reflected against advanced genomics and recombinant DNA technologies. Importantly, modern genomic techniques, including CRISPR-Cas genome editing and its derived applications (e.g. prime editing) will be discussed. The final third of the lecture connects plant breeding to climate change, focusing on the application of biologicals and sustainable crop protection strategies.

In the seminar, students will apply and deepen their knowledge acquired during the lectures in theoretical exercises, focusing on independent assortment of traits, marker-assisted breeding, genomics, and CRISPR-Cas experimental design. Students will further gain hands-on experience with a practical CRISPR-Cas exercise in the lab. Finally, students will present their experimental results and reflect on them in the context of 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)

[go to Table of Contents](#)



Fak726340: Advanced Business Analytics

Valid from: 01.10.2026

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

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 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. The students will gain first coding experience and learn to work with a vast amount of diverse datasets and event-logs, helping them to generate value out of complex data in their future professions.

Consequently, after successful completion of the module students can apply their knowledge in (i) sustainability management, (ii) research and development of sustainable business processes, and (iii) various managerial decision-making positions in the context of bioeconomy.

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)

[go to Table of Contents](#)



Fak726341: Advanced Theories in Food Studies

Valid from: 01.04.2027

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 Bartelmeß, Tina; Prof. Dr.	

Assessments

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

Prerequisites

none

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. These competencies prepare students for professional roles in food systems research, policy, industry, and civil society that require an understanding of how social and cultural factors shape food practices and food system transformations.

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

seminar (2 SWS)

Notes

An introduction to food sociological theories enables students to understand the social, cultural and structural conditions that shape the adoption and societal impacts of bioeconomic innovations in food systems. This perspective is essential for assessing not only their technical and economic feasibility, but also their social acceptance, accessibility and potential contribution to sustainable food-system transformation.

Literature:

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.

[go to Table of Contents](#)



Fak726351: Current Issues in Business Analytics

Valid from: 01.10.2026

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:
Essay	3	3
Presentation	2	2

Prerequisites

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

Learning objectives

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

After successful completion of the module students can apply their knowledge in (i) sustainability management, (ii) research and development of sustainable business processes, and (iii) various managerial decision-making positions in the context of 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 critically evaluate the developed methods for their performance and potential use cases.

Type and scope of the courses

Seminar (2 hours per week)

[go to Table of Contents](#)



Fak726352: Current Issues in Food Studies

Valid from: 01.10.2026

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 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. These competencies prepare students for professional roles in food systems research, policy, industry, and civil society, where communicating complex climate-related challenges and engaging diverse audiences are increasingly important for supporting food system transformations.

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)

[go to Table of Contents](#)



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

Valid from: 01.10.2026

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

Learning objectives

The students acquire detailed and differentiated knowledge about plant stress physiology and become able to connect plant breeding with biologicals and sustainable crop protection strategies. Furthermore, they will become able to reflect upon knowledge gaps, future challenges, and possible research strategies to promote the sustainable production of plant-based foods.

After successful completion of the module students can apply their knowledge in (i) sustainability management, (ii) research and development of sustainable products and production methods, and (iii) plant breeding.

Learning contents

Short lectures will introduce students to the state-of-the-art in the field of plant physiology with a focus on the (molecular) mechanisms of plant stress tolerance and immunity. Furthermore, detailed discussions of recent scientific literature will provide in-depth understanding of molecular mechanisms in plant immunity and state-of-the-art experimental methods and approaches. Over the course of the module, students will be guided to identify knowledge gaps and will learn to develop their own specific research questions based on current literature, to conceptualize approaches to address their research questions, and to discuss their research proposal, focusing on innovative strategies to produce high-quality crops in a sustainable manner.

Type and scope of the courses

Seminar (3 hours per week)

Notes

The course will be held in the first two-thirds of the WS, including 9 sessions of 5 hours each.

[go to Table of Contents](#)



Fak726354: Research Seminar Food System Sciences

Valid from: 01.04.2025

Teaching language English	Duration two semesters	Contact hours (in hours) 15	Self-study hours (in hours) 75
Credit points (CP) 3	Frequency every semester	Person responsible for the module 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).

[go to Table of Contents](#)



Fak726355: (Research) Internship

Valid from: 01.10.2026

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 Suhr, Frank; Prof. Dr.	

Assessments

Title:	Weighting:	CP:
Internship report	0	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

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

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.

[go to Table of Contents](#)



Fak726357: Master's Thesis – Food System Sciences

Valid from: 01.04.2024

Teaching language German/English	Duration	Contact hours (in hours) 0	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/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

[go to Table of Contents](#)

Index

Fak726355: (Research) Internship (26W)	38
Fak726156: Advanced Analytics and Food Quality (26S)	11
Fak726340: Advanced Business Analytics (26W)	32
Fak726175: Advanced Cell-Environment Interactions (27S)	18
Fak726174: Advanced Genetics and Epigenetics (27S)	17
Fak726176: Advanced Human Physiology (27S)	19
Fak726337: Advanced Institutional and Substantive EU Food Law (26S)	25
Fak726338: Advanced Institutional and Substantive International Food Law (25S)	26
Fak726173: Advanced Microbiology – Food Microbiology (26S)	16
Fak726172: Advanced Nutritional Biochemistry and Physiology (27S)	15
Fak726335: Advanced Plant Breeding and Sustainable Food Production (27S)	31
Fak726341: Advanced Theories in Food Studies (27S)	33
Fak726151: Analytics in Life Sciences – from Molecules to Cells (26S)	4
Fak726154: Bioeconomy – Sustainable Production, Business, and Society (27S)	8
Fak726342: Current Issues in Analytical Sciences (26S)	12
Fak726346: Current Issues in Biochemistry and Biotechnology of Microorganisms (25W)	13
Fak726351: Current Issues in Business Analytics (26W)	34
Fak726347: Current Issues in Cellular, Organismal, and Exercise Physiology/Biology (26W)	22
Fak726343: Current Issues in Cellular Responses to External Cues (26W)	14
Fak726350: Current Issues in European and International Environmental Law (26S)	30
Fak726349: Current Issues in European and International Food Trade Economic(s) Law (24S)	29
Fak726348: Current Issues in Food and Health Policy (26W)	28
Fak726352: Current Issues in Food Studies (26W)	35
Fak726345: Current Issues in Human Nutrition in Health and Disease (26W)	21
Fak726344: Current Issues in Nutritional Biochemistry and Immunology (27S)	20
Fak726353: Current Issues in Sustainability and Production of Plant-based Foods (26W)	36
Fak726153: Food Law – from National to International Perspectives (23W)	6
Fak721264: Global Political Economy of Food (26W)	24
Fak726357: Master's Thesis – Food System Sciences (24S)	39
Fak726152: Nutritional Physiology – from Cells to Organisms (26W)	5
Fak726354: Research Seminar Food System Sciences (25S)	37
Fak726336: Seminar Entrepreneurship and Innovation (26S)	23
Fak726155: Study Skills, Science Communication, and Research Seminar (26W)	9