Subdivided Module Catalogue for the Subject Food Chemistry as a Bachelor’s with 1 major with the degree "Bachelor of Science" (180 ECTS credits)

Examination regulations version: 2016
Responsible: Faculty of Chemistry and Pharmacy
Responsible: Institute of Pharmacy and Food Chemistry
Course of Studies - Contents and Objectives

Bachelor's programmes lead to a first professional university degree in the subject or (in the case of subject combinations) in the subjects in question. Students pursuing a Bachelor's degree become familiar with the fundamental principles of the respective academic discipline, they acquire methodological and occupational skills as well as academic writing and research skills and they learn how to apply their knowledge and skills to make a contribution to the community. In addition, Bachelor's programmes foster the personal development of students. The assessments to be taken over the course of the programme have the objective of assessing whether students are proficient in the fundamental principles of the academic discipline in question, have acquired methodological, occupational, and transferable skills, and are prepared to transfer into the professional world. More detailed provisions are set out in the pertinent FSB (subject-specific provisions).

Master's programmes lead to a further professional and research-oriented university degree in the subject or (in the case of subject combinations) in the subjects in question. Master's programmes provide the opportunity for professional and academic specialisation and can be either ‘application-oriented’ or ‘research-oriented’ as specified in the pertinent FSB. Interdisciplinary programmes or programmes in other disciplines, consecutive Master's programmes build on the knowledge and skills previously developed by students (while studying for a Bachelor's degree) and give them the opportunity to deepen, expand, and enhance that knowledge and those skills. The assessments to be taken over the course of the programme have the objective of assessing whether students have developed the profound specialist knowledge and skills necessary for transferring into the professional world, whether they are competent to grasp their discipline, and whether they are able to work independently according to academic standards.

Both Bachelor's and Master's programmes require students to write a thesis in which they are expected to demonstrate their ability to research and write independently on a problem in the discipline in question within a given time frame and adhering to the principles of good academic practice.
Abbreviations used

Course types: E = field trip, K = colloquium, O = conversatorium, P = placement/lab course, R = project, S = seminar, T = tutorial, Ü = exercise, V = lecture

Term: SS = summer semester, WS = winter semester

Methods of grading: NUM = numerical grade, B/NB = (not) successfully completed

Regulations: (L)ASPO = general academic and examination regulations (for teaching-degree programmes), FSB = subject-specific provisions, SFB = list of modules

Other: A = thesis, LV = course(s), PL = assessment(s), TN = participants, VL = prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

    ASPO2015

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

    27-Jul-2016 (2016-92)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.
The subject is divided into

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<td>holder of the Chair of Plant Physiology and Biophysics</td>
<td>Faculty of Biology</td>
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<td>2 semester</td>
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**Contents**

The first part of the winter semester course will discuss the plant cell, the smallest unit of the plant organism, starting with its macroscopic structure before moving on to its microscopic structure. The course will point out differences and similarities between prokaryotic cells (bacteria, archaea) and eukaryotic cells (animals, plants). In the second part of the winter semester course, students will acquire the fundamental knowledge necessary to understand the form (anatomy, morphology and cytology) and function of plant organisms. The summer semester course will introduce students to the fundamental principles of botany, using the example of food and fodder crops. Taking into account their taxonomy, morphology and cytology, the course will discuss the photosynthesis as well as other physiological and genetic aspects of selected crops and their compounds as well as aspects related to the breeding of these crops. In this context, the course will point out differences that may be used, for example, for the microscopic identification of a variety of food and fodder crops.

**Intended learning outcomes**

In the winter semester, students have acquired a knowledge of the structure of plant cells and their (biological) macromolecules as well as of the specific characteristics of the intracellular and extracellular structures of plant cells. In the summer semester, students have acquired the following knowledge and skills:
- Fundamental knowledge of the distinguishing characteristics, genetics, photosynthesis and physiology of representatives of the plant kingdom with special attention to crops.
- Fundamental knowledge of major anatomical and morphological plant traits as well as of the compounds of food and fodder crops.
- Fundamental knowledge of the components and functioning of microscopes.
- Fundamental preparation skills.
- Basic familiarity with methods for the microscopic examination of crops.
- Fundamental skills in the interpretation of macroscopic and histological plant preparations by light microscopy.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + V (1) + P (4)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total)

**Allocation of places**

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**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter e) of Annex 1 of APOLmCh and No. 5 of Annex 2 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Module title: General and Inorganic Chemistry for Food Chemistry Students

Abbreviation: 08-LMC-AC1-152-m01

Module coordinator: holder of the Chair of Food Chemistry

Module offered by: Institute of Pharmacy and Food Chemistry

ECTS: 14

Method of grading: numerical grade

Only after succ. compl. of module(s)

Duration: 1 semester

Module level: undergraduate

Other prerequisites:

Contents:

Basic concepts of inorganic chemistry, nomenclature, atomic structure and periodic system; types of chemical bondings, intermolecular binding forces, solutions and heterogeneous systems, basics in thermodynamics and kinetics of chemical reactions, chemical equilibrium, law of mass action, acid/base systems and redox systems, reaction equation and stoichiometry (occurrence, presentation, properties, formula (molecular and structural formula, and stereotype)) and reaction of elements and substance groups as well as their qualitative inorganic analysis, with special on elements frequently occuring in foods, and environment or which are of toxicological interest.

Intended learning outcomes:

The students understand the basics of inorganic chemistry, including chemical calculations and knowledge about the most important elements. They can set up equations of reactions and assess the reactions which are possible for inorganic substance groups. The students apply their theoretical knowledge in the laboratory by performing detection reactions of inorganic ions, also in mixtures and in matrices. The students know basic working techniques in a chemical laboratory and follow safety instructions. They can independently detect and identify inorganic compounds in drinking water and confirm their results.

Courses:

V (2) + S (2) + P (8)

Method of assessment:

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups of 2 candidates (approx. 30 minutes total) and a) Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments (approx. 2 to 4 pages per analysis, no more than 60 pages total) or b) completion and written documentation (approx. 1 to 2 pages) of a theoretical assignment (approx. 30 minutes), Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments in lab notebook (approx. 2 to 4 pages per analysis, no more than 60 pages total).

Allocation of places:

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Additional information:

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter a) and No. I 1. Letter a) of Annex 1 of APOLmCh and No. 1 of Annex 2 of APOLmCh.

Referred to in LPO I (examination regulations for teaching-degree programmes):
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<td>08-LMC-FSQ1-162-m01</td>
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<tbody>
<tr>
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<td>Institute of Pharmacy and Food Chemistry</td>
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<td>1 semester</td>
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**Contents**

The occupational profile of a Food Chemist serving as basis for the degree program food chemistry. General strategies for qualitative and quantitative analyses. Calibration strategies. Accuracy and quality of chemical analysis. Interpretation of measured data with statistical methods.

**Intended learning outcomes**

The students know the basics of planning, performing and analysis of analytical methods, including the interpretation of the data using statistical methods as well as the validation of their results.

**Courses (type, number of weekly contact hours, language — if other than German)**

S (2) + S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written exercise (approx. 10 pages)

**Allocation of places**

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**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLMCh) in conjunction with No. II 1. Letter a) of Annex 1 of APOLMCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<td>Institute of Pharmacy and Food Chemistry</td>
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### Contents

The module enables the processing of a defined problem within a specified period by applying the scientific methods learned in the course of study.

### Intended learning outcomes

The student has the ability to deal with a defined problem/issue using scientific methods and to document the results.

### Courses

No courses assigned to module

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Bachelor's thesis

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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Module title | Biochemistry 1  
|---|---
| Abbreviation | 08-BC1-152-m01  
| Module coordinator | holder of the Chair of Biochemistry  
| Module offered by | Chair of Biochemistry  
| ECTS | 5  
| Method of grading | numerical grade  
| Only after succ. compl. of module(s) | --  
| Duration | 1 semester  
| Module level | undergraduate  
| Other prerequisites | --  

### Contents

The module imparts the basic knowledge of biochemistry by lectures and tutorials. Main topics of the module Biochemistry 1 are particularly the biochemistry of proteins (amino acids, peptide bond, primary, secondary, tertiary and quaternary structure), catalytic strategies and enzyme kinetics, carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle, cellular respiration, photosynthesis), fatty acid metabolism (beta-oxidation, fatty acid synthesis), nucleotide metabolism, urea cycle and metabolism of amino acids. Additionally the module conveys basic knowledge about the structure of DNA and the basics of passing and transformation of genetic information (central dogma).

### Intended learning outcomes

The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

### Courses

(type, number of weekly contact hours, language — if other than German)

V (2) + Ü (1)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 90 minutes)

### Allocation of places

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### Additional information

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### Referred to in LPO 1 (examination regulations for teaching-degree programmes)

§ 42 I Nr. 2  
§ 62 I Nr. 2
### Module title
**Biochemistry 2**

### Abbreviation
08-BC2-152-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
5

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
The module imparts the basic knowledge of biochemistry by lectures and in-depth tutorials. Main topics of the module Biochemistry 2 are particularly Replication, DNA repair, transcription, mRNA maturation, translation and regulation of translation, protein targeting, nuclear transport, and protein degradation. Additionally the module conveys basic knowledge about the cellular signal transduction.

### Intended learning outcomes
The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

### Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (1)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 60 to 90 minutes)

### Allocation of places
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### Additional information
Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLMCh) in conjunction with No. II 2. Letter e) and No. II 1. Letter c) of Annex 1 of APOLMCh and No. 3 of Annex 3 of APOLMCh.

### Referred to in LPO I (examination regulations for teaching-degree programmes)
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**Contents**

Basics in analysis of organic molecules taking into account physical separation techniques and measurement methods.

**Intended learning outcomes**

The students know the principles of spectroscopy, chromatography and electrochemistry as well as the field of application of each method. They know the mathematical and statistical analysis and interpretation of spectra and chromatograms.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total)

**Allocation of places**

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**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. 1 2. Letter a) of Annex 1 of APOLmCh and No. 1 of Annex 2 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
### Module title
Introduction to Food Chemistry

### Abbreviation
08-LMC-LMCo-162-m01

### Module coordinator
holder of the Chair of Food Chemistry

### Module offered by
Institute of Pharmacy and Food Chemistry

### ECTS
5

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Introduction to chemistry of food components.

### Intended learning outcomes
The students know basic structures, properties and reactions of proteins, carbohydrates and lipids as well as their importance in food.

### Courses
(type, number of weekly contact hours, language — if other than German)

V (2) + Ü (1)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total)

### Allocation of places
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<td>Institute of Pharmacy and Food Chemistry</td>
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<td>1 semester</td>
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**Contents**
Basics in methods in molecular biology - theory and practice.

**Intended learning outcomes**
The students can perform basic molecular biology techniques for DNA isolation, polymerase chain reaction, agarose gel electrophoresis and restriction enzyme digestion and they can interpret molecular biological data.

**Courses**
(type, number of weekly contact hours, language — if other than German)
P (3) + S (2)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments (approx. 2 to 4 pages per analysis, no more than 60 pages total) or b) completion and written documentation (approx. 1 to 2 pages) of a theoretical assignment (approx. 30 minutes), Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments in lab notebook (approx. 2 to 4 pages per analysis, no more than 60 pages total)

**Allocation of places**
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**Additional information**
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**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
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<tr>
<td>Introduction to Physics for Students of other Disciplines</td>
<td>11-EFNF-152-m01</td>
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**Module coordinator**
Managing Director of the Institute of Applied Physics

**Module offered by**
Faculty of Physics and Astronomy

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**Duration**
2 semester

**Module level**
undergraduate

**Contents**
Mechanics, vibration theory, thermodynamics, optics, science of electricity, Atomic and Nuclear Physics.

**Intended learning outcomes**
The students have knowledge of the principles of Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)
V (4) + V (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (60 to 120 minutes)

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
Instrumental Analysis for Food Chemistry Students

Abbreviation: 08-LMC-LMA-152-m01

Module coordinator: holder of the Chair of Food Chemistry

Module offered by: Institute of Pharmacy and Food Chemistry

ECTS: 10

Method of grading: Only after succ. compl. of module(s)

(Not) successfully completed: 08-LMC-AC3, 08-LMC-OCP or 08-OCP1-LMC

Duration: 1 semester

Module level: undergraduate

Other prerequisites: --

Contents
Basics in analysis of food, tobacco products, cosmetic products, consumer goods and animal feed; with special focus on spectroscopic and chromatographic methods.

Intended learning outcomes
The students can plan and perform qualitative and quantitative analysis of food by spectroscopic (photometry, fluorimetry) and chromatographic (thin layer chromatography, high performance liquid chromatography and gas chromatography) methods.

Courses (type, number of weekly contact hours, language — if other than German)
S (1) + S (1) + P (10)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments (approx. 2 to 4 pages per analysis, no more than 60 pages total) or b) completion and written documentation (approx. 1 to 2 pages) of a theoretical assignment (approx. 30 minutes), Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments in lab notebook (approx. 2 to 4 pages per analysis, no more than 60 pages total)

Allocation of places
--

Additional information
Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter a) and No. I 1. Letter a) of Annex 1 of APOLmCh and No. 1 of Annex 2 of APOLmCh.

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
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Food Chemistry | 08-LMC-LMC-162-m01

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</table>

**Contents**

Knowledge and analysis of food, tobacco products and animal feed, particularly carbohydrate and lipid-containing food and feed. Basics in knowledge of food technology processes.

**Intended learning outcomes**

The students know the chemical composition of foods rich in carbohydrates, fat or proteins and the accompanying analysis. The students can develop and present a seminar on foodstuff and food technology.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + S (2) + V (1) + S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total). 100 per cent of grade

**Allocation of places**

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**Additional information**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Subdivided Module Catalogue for the Subject
Food Chemistry
Bachelor’s with 1 major, 180 ECTS credits

Module title | Abbreviation
-----------------|-----------------
Mathematics for students in Chemistry and Biology | 10-M-MCB-152-m01

Module coordinator | Module offered by
Dean of Studies Mathematik (Mathematics) | Institute of Mathematics

ECTS | Method of grading | Only after succ. compl. of module(s)
--- | --- | ---
5 | numerical grade | --

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | undergraduate | --

Contents
Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation of functions in several variables, power series, ordinary differential equations, systems of linear equations, basic notions in statistics.

Intended learning outcomes
The student is able to recognise and phrase simple questions from natural sciences as mathematical problems, apply basic mathematical methods to them and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)
V (3) + Ü (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 90 to 120 minutes) and written exercises (approx. 25)

Allocation of places
--

Additional information
Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. 1 2. Letter f) of Annex 1 of APOLmCh.

Referred to in LPO I (examination regulations for teaching-degree programmes)
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<td>Microbiology of Food and Hygiene for Food Chemistry Students</td>
<td>03-LMC-HYG-152-m01</td>
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<td>Institute of Hygiene and Microbiology</td>
<td>Faculty of Medicine</td>
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<td>1 semester</td>
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### Contents

The students will gain knowledge on food-related topics of hygiene and microbiology. This includes relevant, food-contaminating microorganisms and the infections/diseases they provoke; antimicrobial drugs/substances; hygiene management, food decay.

### Intended learning outcomes

Students gain knowledge on food microbiology and hygiene: fundamentals of microbial systematics, morphology, cytology and physiology; knowledge on the role of pathogens (microorganisms, toxin producers, viruses, prions, parasites) for food chemistry and food technology (decay, intoxications, analytical microbiology, biotechnology); knowledge on the diagnosis and cultivation of microorganisms; knowledge on microbial inactivation (disinfection, sterilisation); fundamentals of the pathogenesis of important human pathogens and clinical consequences of microbial infection; fundamentals of medically relevant antiinfectives and the development of drug resistances.

### Courses

(type, number of weekly contact hours, language — if other than German)

V (2) + P (2)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total)

### Allocation of places

--

### Additional information

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. II 2. Letter f) and No. II 1. Letter b) of Annex 1 of APOLmCh and No. 4 of Annex 3 of APOLmCh.

Referred to in LPO I (examination regulations for teaching-degree programmes)

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<td>Microbiology for Food Chemistry students</td>
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<td>1 semester</td>
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**Contents**

This module comprises a lecture and accompanying exercises. During the theoretical part, students will acquire the fundamentals of bacteriology; during exercises, these will be illustrated by help of suitable experiments. The lecture will acquaint students with the fundamental principles of the cultivation, enrichment, identification and control of bacteria. In addition, it will explore the significance of bacteria both for global nutrient cycles and as mutualists, commensals and pathogens in humans. The lecture will also discuss the significance of bacteria as producers of antibiotics, the role of bacteriophages and horizontal gene transfer. During exercises, students will apply fundamental techniques for the cultivation and isolation of bacteria and will test the efficacy of a range of sterilisation and disinfection methods. They will also apply both classical macroscopic and microscopic methods for the identification and classification of bacteria. Additional exercises will provide students with an opportunity to perform experiments on antibiotic sensitivity/resistance and horizontal gene transfer.

**Intended learning outcomes**

Students are familiar with the fundamental principles of bacteriology. They are familiar with simple experimental techniques for addressing scientific issues in bacteriology and are able to apply these (e.g. detection and identification of bacteria).

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Log (approx. 30 pages)
Assessment offered: Once a year, summer semester

**Allocation of places**

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**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. II 2. Letter f) and No. II 1. Letter b) of Annex 1 of APOLmCh and No. 4 of Annex 3 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<td>Organic Chemistry Including Nomenclature and Stereochemistry for Food Chemistry Students</td>
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<td>1 semester</td>
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</table>

**Contents**

Basic principles of organic chemistry, such as nomenclature, types of chemical bondings; Sum formulas, structural formulas; Reaction types and mechanisms; chemical characteristics; Reaction of the most important chemical families, especially of natural products; Chemistry of functional groups; Structure and Reactivity; Basics in synthetic and biopolymers. Stereochemistry and nomenclature of the most important chemical families, with focus on natural products.

**Intended learning outcomes**

The students know basic synthesis mechanisms and can deduce the reactions and properties of chemical compounds based on their functional groups. The students know the rules for the nomenclature of organic compounds according to IUPAC, common trivial names and the derivation of the structural formulas by the structure name. They know the basic concepts and the meaning of stereochemistry as well as rules to term stereochemical compounds.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (1) + S (1) + V (1) + V (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total)

**Allocation of places**

--

**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter b) and No. I 1. Letter b) of Annex 1 of APOLmCh and No. 2 of Annex 2 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
### Module title
Physical Chemistry for Biology Majors

### Abbreviation
08-PC-Bio-152-m01

### Module coordinator
Lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie für Studierende der Biologie and Lebensmittelchemie"

### Module offered by
Institute of Physical and Theoretical Chemistry

### ECTS
5

### Method of grading
Numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
Undergraduate

### Other prerequisites
Successful completion of the written examination serves as proof of all safety-related skills and is a prerequisite for attendance of the lab course.

### Contents
This module deals with basics of thermodynamics, kinetics and electrochemistry.

### Intended learning outcomes
Students have become familiar with the fundamental principles of thermodynamics, kinetics and electrochemistry. They are able to understand and explain fundamental processes in nature and engineering.

### Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (1) + P (1)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 60 minutes) and assessment of practical skills during lab course (ungraded): Vor- testate/Nachtestate (pre and post-experiment exams, approx. 15 minutes each), assessment of practical assignments, log (approx. 5 to 10 pages)

Assessment offered: Once a year, winter semester

### Allocation of places
--

### Additional information
Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter c) and No. I 1. Letter c) of Annex 1 of APOLmCh and No. 3 of Annex 2 of APOLmCh.

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**Contents**

Simple experiments in the fields of mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics, imaging methods.

**Intended learning outcomes**

The students have detected and understood physical contexts on the basis of the implementation of own experiments. They have a basic understanding of physical phenomena and know the basic ideas and ways of functioning of different measuring and imaging methods as well as their applications, especially in the field of Biomedicine.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (4)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).

Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

**Allocation of places**

Only as part of pool of general transferable skills (ASQ): 10 places (lottery)

**Additional information**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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## Module title

**Practical Course in Organic Chemistry for Food Chemistry Students**

<table>
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### Module coordinator

holder of the Chair of Medicinal and Pharmaceutical Chemistry

### Module offered by

Institute of Pharmacy and Food Chemistry

### ECTS

10

### Method of grading

(Not) successfully completed

### Only after succ. compl. of module(s)

08-LMC-AC1

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

Successful completion of a written examination (90 to 120 minutes) serves as proof of all safety-related skills and is a prerequisite for attendance of the lab course.

### Contents

Basic principles of organic chemistry, such as nomenclature, types of chemical bondings; Sum formulas, structural formulas; Reaction types and mechanisms; chemical characteristics; Reaction of the most important chemical families, with focus on natural products; Chemistry of functional groups; Structure and Reactivity; Basics in synthetic and biopolymers.

### Intended learning outcomes

The students know basic techniques to carry out the synthesis of various classes of substances and the verification of the resulting products regarding purity and identity.

### Courses

(type, number of weekly contact hours, language — if other than German)

P (12)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments (approx. 2 to 4 pages per analysis, no more than 60 pages total) or b) completion and written documentation (approx. 1 to 2 pages) of a theoretical assignment (approx. 30 minutes), Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments in lab notebook (approx. 2 to 4 pages per analysis, no more than 60 pages total)

### Allocation of places

--

### Additional information

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. 1.2. Letter b) and No. 1.1. Letter b) of Annex 1 of APOLmCh and No. 2 of Annex 2 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Module title: Practical Course in Food Chemistry
Abbreviation: 08-LMC-LMCP-152-m01

Module coordinator: holder of the Chair of Food Chemistry
Module offered by: Institute of Pharmacy and Food Chemistry

ECTS: 13
Method of grading: Only after succ. compl. of module(s)
Duration: 2 semester
Module level: undergraduate
Other prerequisites: --

Contents:
Basics in analysis of food, tobacco products and animal feeds including the interpretation of data with statistical methods. Special focus on food and feed containing carbohydrates and lipids.

Intended learning outcomes:
The students can perform the analysis of particular carbohydrate-containing, fat-containing and protein-containing foods. They can choose an appropriate methods, analyze different foods, verify the accuracy of their analysis and interpret their results in the light of current literature.

Courses (type, number of weekly contact hours, language — if other than German):
P (10) + P (14)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus):
a) Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments (approx. 2 to 4 pages per analysis, no more than 60 pages total) or b) completion and written documentation (approx. 1 to 2 pages) of a theoretical assignment (approx. 30 minutes), Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments in lab notebook (approx. 2 to 4 pages per analysis, no more than 60 pages total) and summary report (approx. 15 to 20 pages each)

Allocation of places: --

Additional information:
Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. II 1. Letter a) of Annex 1 of APOLmCh.

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<td>1 semester</td>
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<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Quality management in chemical laboratories.

**Intended learning outcomes**

The students can apply the basic principles of industrial quality management and can develop and apply a standard operating procedure.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (1) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (approx. 20 pages)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Quantitative Inorganic Analysis for Food Chemistry Students</td>
<td>o8-LMC-AC3-152-m01</td>
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<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tr>
<td>holder of the Chair of Food Chemistry</td>
<td>Institute of Pharmacy and Food Chemistry</td>
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</table>

**Contents**

Reaction equation, stoichiometry and reaction of elements and substance groups. Quantitative inorganic analysis, with focus on elements frequently occurring in (drinking) water, and environment or which are of toxicological interest.

**Intended learning outcomes**

The students perform independently a literature research on the inorganic composition and analysis of different types of water and present the results. They can select and apply an appropriate analytical method for a precise and correct quantification of inorganic ions in water samples. They can interpret the quality and relevance of the results obtained. They identify relevant key data for the interpretation and discussion of their results, taking into account the nature of the water sample.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (10) + S (1) + S (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments (approx. 2 to 4 pages per analysis, no more than 60 pages total) or b) completion and written documentation (approx. 1 to 2 pages) of a theoretical assignment (approx. 30 minutes), Vortestate and Nachtestate (pre and post-experiment exams, approx. 15 minutes), documentation and assessment of practical assignments in lab notebook (approx. 2 to 4 pages per analysis, no more than 60 pages total) and talk (approx. 20 minutes)

Assessment offered: Once a year, summer semester

**Allocation of places**

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**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. 1 2. Letter a) and No. 1 1. Letter a) of Annex 1 of APOLmCh and No. 1 of Annex 2 of APOLmCh.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Quantitative Inorganic Chemistry for Food Chemistry Students

<table>
<thead>
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<td>Quantitative Inorganic Chemistry for Food Chemistry Students</td>
<td>08-LMC-AC2-152-m01</td>
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<tbody>
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<td>undergraduate</td>
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</table>

## Contents

Reaction equation, stoichiometry and reaction of elements and substance groups. Quantitative inorganic analysis, with focus on elements frequently occurring in foods, and environment or which are of toxicological interest.

## Intended Learning Outcomes

The students know appropriate analytical methods for the quantitation of inorganic ions. After formulation of the chemical reaction and its stoichiometry the students can calculate the amount of an analyte in the samples.

## Courses

<table>
<thead>
<tr>
<th>Type</th>
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<th>Language</th>
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<td>(3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ü</td>
<td>(1)</td>
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</table>

## Method of Assessment

a) written examination (60 to 120 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes total)

## Allocation of Places

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## Additional Information

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter a) and No. I 1. Letter a) of Annex 1 of APOLmCh and No. 1 of Annex 2 of APOLmCh.

## Referred to in LPO I

(examination regulations for teaching-degree programmes)

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<table>
<thead>
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<tr>
<td>Toxicology and legal studies</td>
<td>03-TR-152-m01</td>
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**Module coordinator**  
lecturer of lecture "Toxikologie und Rechtskunde"

**Module offered by**  
Faculty of Medicine

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<tr>
<td>3</td>
<td>numerical grade</td>
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**Duration**  
1 semester

**Module level**  
undergraduate

**Other prerequisites**  
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**Contents**
Basics of legal regulations for chemists (handling and transportation of hazardous materials), fundamentals of toxicology.

**Intended learning outcomes**
The students master the basics of legal regulations for chemists (handling and transport of hazardous substances) as well as the fundamentals of toxicology.

**Courses**  
(type, number of weekly contact hours, language — if other than German)

V (1) + V (1)

**Method of assessment**  
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 90 minutes)

**Allocation of places**  
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**Additional information**  
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**Referred to in LPO I**  
(examination regulations for teaching-degree programmes)

§ 22 II Nr. 1 h)  
§ 22 II Nr. 2 f)  
§ 22 II Nr. 3 f)