Module Catalogue for the Subject Biofabrication as a Master’s with 1 major with the degree "Master of Science" (120 ECTS credits)

Examination regulations version: 2015
Responsible: Faculty of Chemistry and Pharmacy
# Contents

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- Physical chemistry of supramolecular assemblies
- Fundamentals of Tissue Engineering and Quality Management

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## Compulsory Electives Theoretical Biofabrication

### Theoretical Biofabrication
- Carrier materials and devices for therapeutic compounds
- Supramolecular Chemistry (Basics)
- Microsystems for biological and medicinal Applications
- Polymer Materials 1: Technology of Polymer Modification

### Thesis
- Master-Thesis Biofabrication
- Final Colloquium

## Compulsory Courses Practical Biofabrication Double Degree

### Practical Biofabrication
- BioFab Research-Thesis 1
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## Compulsory Electives Theoretical Biofabrication Double Degree

### Theoretical Biofabrication
- Polymers II
- Biofabrication
- Physical chemistry of supramolecular assemblies
- Fundamentals of Tissue Engineering and Quality Management
- Carrier materials and devices for therapeutic compounds
- Supramolecular Chemistry (Basics)
- Microsystems for biological and medicinal Applications
- Polymer Materials 1: Technology of Polymer Modification
- Courses at the partner university (BioFab Master)

### Thesis
- Master-Thesis Biofabrication
- Final Colloquium
The subject is divided into

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Content and Objectives of the Programme

The degree subject Biofabrication is offered by the Faculty of Chemistry and Pharmacy of the JMU as a research-oriented degree program with the degree "Master of Science" (M.Sc.).

The program prepares for scientific activities in research, development and application in the interdisciplinary field of biofabrication and a subsequent doctoral program. Upon successful completion of the training, students have in-depth knowledge of scientific work in research and application of biofabrication.

For this purpose, students have the opportunity to deepen the basic knowledge acquired in the first Master's semester in two six-month lab projects.

Through the education and training of analytical thinking, students acquire the ability to later familiarize themselves with varied tasks assigned to them and, in particular, to independently apply the basic knowledge acquired in the degree program and transfer it to new tasks.
**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)):


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.
Compulsory Courses

(80 ECTS credits)
Theoretical Basics of Biofabrication
(20 ECTS credits)
Module title | Abbreviation
---|---
Polymers II | 03-PM2-152-m01

Module coordinator | Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry | Faculty of Medicine

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<th>ECTS</th>
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Contents

In-depth knowledge and practical application of: - free radical polymerisation, polyaddition - ionic polymerisations - controlled radical polymerisation - polymer characterisation (e.g. gel permeation chromatography, endgroup analysis, mass spectrometry) - current aspects of polymer research (e.g. block-copolymers, polymer topographies, polymer functionalisation).

Intended learning outcomes

Students acquire an advanced knowledge of polymer synthesis, modification and characterisation.

Courses

A (no information on weekly contact hours available)

Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (30 minutes)

Language of assessment: German and/or English

Allocation of places

--

Additional information

--

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

--
Module title | Abbreviation
---|---
Biofabrication | 03-BIOFAB-152-m01

Module coordinator | Module offered by
---|---
holder of the Chair of Functional Materials in Medicine and Dentistry | Faculty of Medicine

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

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

Contents
Definitions within biomaterials, tissue engineering and biofabrication, overview of medical device regulations and practices, description of extracellular matrix, bioprinting, continuous liquid interface polymerisation, two-photon polymerisation, fused deposition modelling, inorganic powder printing, stereolithography, selective laser sintering, melt electrospinning writing, self-healing hydrogels, polymers in 3D printing, introduction to rheology, scientific method and reproducibility, digital signal generation and quality control.

Intended learning outcomes
Students gain a thorough appreciation of the different additive manufacturing (3D printing) technologies available in the context of biofabrication. This includes how the polymers are processed and how each class of 3D printer works, with its strengths and weaknesses. A holistic view of biofabrication is taught, with an understanding of scientific methodology for each stage and the different regulations governing medical devices. Students will acquire the necessary skills to critique and develop opinions on the 3D printing industry and the resulting biomedical applications.

Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (1)
Module taught in: V, Ü: English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (30 minutes)
Language of assessment: English

Allocation of places
--

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title: Physical chemistry of supramolecular assemblies  
Abbreviation: 08-PCM5-152-m01

Module coordinator: Lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"  
Module offered by: Institute of Physical and Theoretical Chemistry

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Duration: 1 semester  
Module level: graduate  
Other prerequisites: --

Contents:

German contents available but not translated yet.


Intended learning outcomes:

German intended learning outcomes available but not translated yet.


Courses:

S (2) + Ü (1)

Method of assessment:

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) talk (approx. 30 minutes)

Language of assessment: German and/or English

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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<td>Fundamentals of Tissue Engineering and Quality Management</td>
<td>03-SP1A2-152-m01</td>
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**Module coordinator**

holder of the Chair of Regenerative Medicine and holder of the Chair of Functional Materials in Medicine and Dentistry

**Module offered by**

Faculty of Medicine

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**Duration**

1 semester

**Module level**

graduate

**Other prerequisites**

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**Contents**


**Intended learning outcomes**

Students are familiar with the fundamental principles of tissue engineering and quality management.

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

V (2) + P (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) report on practical course (approx. 10 pages) and b) written examination (approx. 90 minutes) or presentation (approx. 30 minutes)

Language of assessment: German and/or English

**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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Practical Biofabrication
(60 ECTS credits)
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<td>08-BFFP1-152-m01</td>
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<td>chairperson of examination committee Biofabrikation (Biofabrication)</td>
<td>Chair of Biochemistry</td>
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<td>1 semester</td>
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**Contents**

The module deepens special synthesis and analysis methods in the field of Biofabrication. The students work independently in the laboratory, record their research results in a report and present them in a scientific talk.

**Intended learning outcomes**

The student is able to experimentally carry out advanced synthesis and analysis methods in the field of Biofabrication and to evaluate the obtained results. He/She can record research results in a scientific report and present them in a talk.

**Courses**

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

P (0)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

report on practical course (40 to 60 pages) and talk (approx. 20 to 30 minutes)
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

--
Module title | BioFab Research-Thesis 2
Abbreviation | 08-BFFP2-152-m01

Module coordinator | chairperson of examination committee Biofabrikation (Biofabrication)
Module offered by | Chair of Biochemistry

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

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

Contents
The module deepens special synthesis and analysis methods in the field of Biofabrication. The students work independently in the laboratory, record their research results in a report and present them in a scientific talk.

Intended learning outcomes
The student is able to experimentally carry out advanced synthesis and analysis methods in the field of Biofabrication and to evaluate the obtained results. He/She can record research results in a scientific report and present them in a talk.

Courses (type, number of weekly contact hours, language — if other than German)
P (0)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
report on practical course (40 to 60 pages) and talk (approx. 20 to 30 minutes)
Language of assessment: German and/or English

Allocation of places
--

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Compulsory Electives Theoretical Biofabrication
(10 ECTS credits)
Theoretical Biofabrication
(10 ECTS credits)
### Module Catalogue for the Subject
### Biofabrication
#### Master’s with 1 major, 120 ECTS credits

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<tr>
<td>holder of the Chair of Functional Materials in Medicine and Dentistry</td>
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**Contents**

Integration and binding of active agents in particles, functionalisation of particles for (intracellular) transport processes, targeting and release of the active agents.

**Intended learning outcomes**

Students have developed a knowledge of the integration and binding of active agents in particles and of the functionalisation of particles for (intracellular) transport processes, targeting and release of active agents.

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

V (2) + P (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) report on practical course (approx. 10 pages) and b) written examination (approx. 90 minutes) or presentation (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

--
### Supramolecular Chemistry (Basics)

**Module title**
Supramolecular Chemistry (Basics)

**Abbreviation**
08-SCM1-152-m01

**Module coordinator**
Lecturer of lecture "Organischen Chemie"

**Module offered by**
Faculty of Chemistry and Pharmacy

**ECTS**
5

**Method of grading**
Numerical grade

**Duration**
1 semester

**Module level**
Graduate

**Other prerequisites**
--

**Contents**
German contents available but not translated yet.


**Intended learning outcomes**
German intended learning outcomes available but not translated yet.


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

S (3)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes)
Language of assessment: German and/or English

**Allocation of places**
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**Additional information**
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**Referred to in LPO 1**
(examination regulations for teaching-degree programmes)

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<td>holder of the Chair of Functional Materials in Medicine and Dentistry and holder of the Chair of Regenerative Medicine</td>
<td>Faculty of Medicine</td>
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**Contents**

Implantable drug delivery systems, lab-on-a-chip systems for bioanalysis, bioreactor technology, lab course: nanoparticles for regenerative medicine and protein biochemistry.

**Intended learning outcomes**

Students have developed a knowledge of implantable drug delivery systems and lab-on-a-chip systems for bioanalysis, bioreactor technology, nanoparticles for regenerative medicine and protein biochemistry.

**Courses**

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

V (2) + P (1)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) report on practical course (approx. 10 pages) and b) written examination (approx. 90 minutes) or presentation (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
## Module title

**Polymer Materials 1: Technology of Polymer Modification**

**Abbreviation**

08-PW1-152-m01

## Module coordinator

holder of the Chair of Chemical Technology of Material Synthesis

## Module offered by

Chair of Chemical Technology of Material Synthesis

## ECTS

5

## Method of grading

numerical grade

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

--

## Duration

1 semester

## Module level

graduate

## Other prerequisites

--

## Contents

Methods of polymer synthesis; composition of polymers and polymer compounds; properties of polymers; technologies for the production of polymers compound and polymer components; means of characterisation of polymer compounds and polymer components.

## Intended learning outcomes

The students possess knowledge of the special properties of polymers and polymer compounds (e.g. time and temperature dependent viscoelastic behaviour). They know the characteristics of important production technologies (methods of polymer synthesis, compounding technologies, processing methods e.g. injection moulding) and understands the different ways of influencing properties of materials and manufactured products. They have knowledge of ways to calculate complex flow conditions in polymer processing machines and tools.

## Courses

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

V (2) + P (1)

## Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (30 minutes)

Assessment offered: Once a year, winter semester

Language of assessment: German and/or English

## Allocation of places

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## Additional information

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## Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
Thesis

(30 ECTS credits)
### Module title
Master-Thesis Biofabrication

### Abbreviation
08-MBF-MT-152-m01

### Module coordinator
degree programme coordinator Chemie (Chemistry)

### Module offered by
Chair of Biochemistry

### ECTS
25

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

## 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
- **written thesis (approx. 60 pages)**
- Language of assessment: German and/or English

## Allocation of places
--

## Additional information
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## Referred to in LPO I (examination regulations for teaching-degree programmes)
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<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Biochemistry</td>
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**Contents**

German contents available but not translated yet.

Wissenschaftliche Verteidigung der Ergebnisse der Master-Thesis.

**Intended learning outcomes**

The student is able to defend the results of her/his Master's Thesis in a scientific discussion.

**Courses**

No courses assigned to module

**Method of assessment**

final colloquium (approx. 60 minutes): talk (approx. 30 minutes) with subsequent discussion (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
Compulsory Courses Practical Biofabrication Double Degree
(60 ECTS credits)
Practical Biofabrication
(60 ECTS credits)
Module title | Abbreviation
---|---
BioFab Research-Thesis 1 | 08-BFFP1-152-m01

Module coordinator | Module offered by
chairperson of examination committee Biofabrikation (Bio-fabrication) | Chair of Biochemistry

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

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

Contents
The module deepens special synthesis and analysis methods in the field of Biofabrication. The students work independently in the laboratory, record their research results in a report and present them in a scientific talk.

Intended learning outcomes
The student is able to experimentally carry out advanced synthesis and analysis methods in the field of Biofabrication and to evaluate the obtained results. He/She can record research results in a scientific report and present them in a talk.

Courses (type, number of weekly contact hours, language — if other than German)
P (0)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
report on practical course (40 to 60 pages) and talk (approx. 20 to 30 minutes)
Language of assessment: German and/or English

Allocation of places
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Additional information
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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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</table>

**Contents**

The module deepens special synthesis and analysis methods in the field of Biofabrication. The students work independently in the laboratory, record their research results in a report and present them in a scientific talk.

**Intended learning outcomes**

The student is able to experimentally carry out advanced synthesis and analysis methods in the field of Biofabrication and to evaluate the obtained results. He/She can record research results in a scientific report and present them in a talk.

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

P (0)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Report on practical course (40 to 60 pages) and talk (approx. 20 to 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

--
Compulsory Electives Theoretical Biofabrication Double Degree
(30 ECTS credits)
Theoretical Biofabrication

(30 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Polymers II</td>
<td>03-PM2-152-m01</td>
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<tbody>
<tr>
<td>holder of the Chair of Functional Materials in Medicine and Dentistry</td>
<td>Faculty of Medicine</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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</tbody>
</table>

**Contents**

In-depth knowledge and practical application of: - free radical polymerisation, polyaddition - ionic polymerisations - controlled radical polymerisation - polymer characterisation (e.g. gel permeation chromatography, end-group analysis, mass spectrometry) - current aspects of polymer research (e.g. block-copolymers, polymer topographies, polymer functionalisation).

**Intended learning outcomes**

Students acquire an advanced knowledge of polymer synthesis, modification and characterisation.

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

A (no information on weekly contact hours available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

--
# Module Catalogue for the Subject Biofabrication

## Master's with 1 major, 120 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Biofabrication</td>
<td>03-BIOFAB-152-m01</td>
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<tr>
<td>1 semester</td>
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</table>

## Contents

Definitions within biomaterials, tissue engineering and biofabrication, overview of medical device regulations and practices, description of extracellular matrix, bioprinting, continuous liquid interface polymerisation, two-photon polymerisation, fused deposition modelling, inorganic powder printing, stereolithography, selective laser sintering, melt electrospinning writing, self-healing hydrogels, polymers in 3D printing, introduction to rheology, scientific method and reproducibility, digital signal generation and quality control.

## Intended learning outcomes

Students gain a thorough appreciation of the different additive manufacturing (3D printing) technologies available in the context of biofabrication. This includes how the polymers are processed and how each class of 3D printer works, with its strengths and weaknesses. A holistic view of biofabrication is taught, with an understanding of scientific methodology for each stage and the different regulations governing medical devices. Students will acquire the necessary skills to critique and develop opinions on the 3D printing industry and the resulting biomedical applications.

## Courses

<table>
<thead>
<tr>
<th>type, number of weekly contact hours, language — if other than German</th>
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<tbody>
<tr>
<td>V (2) + Ü (1)</td>
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</table>

Module taught in: V, Ü: English

## Method of assessment

<table>
<thead>
<tr>
<th>type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus</th>
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<tbody>
<tr>
<td>a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (30 minutes)</td>
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Language of assessment: English

## 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>Physical chemistry of supramolecular assemblies</td>
<td>08-PCM5-152-m01</td>
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</table>

**Module coordinator**

Lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"

**Module offered by**

Institute of Physical and Theoretical Chemistry

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</table>

**Duration**

1 semester

**ECTS**

Graduate

**Other prerequisites**

--

**Contents**

German contents available but not translated yet.


**Intended learning outcomes**

German intended learning outcomes available but not translated yet.


**Courses**

S (2) + Ü (1)

**Method of assessment**

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) talk (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

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**Additional information**

--

**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>Fundamentals of Tissue Engineering and Quality Management</td>
<td>03-SP1A2-152-m01</td>
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<table>
<thead>
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<tbody>
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<td>holder of the Chair of Regenerative Medicine and holder of the Chair of Functional Materials in Medicine and Dentistry</td>
<td>Faculty of Medicine</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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</table>

**Contents**


**Intended learning outcomes**

Students are familiar with the fundamental principles of tissue engineering and quality management.

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

- V (2) + P (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- a) report on practical course (approx. 10 pages) and b) written examination (approx. 90 minutes) or presentation (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

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

--
### Module title
Carrier materials and devices for therapeutic compounds

### Abbreviation
03-SP3A1-152-m01

### Module coordinator
holder of the Chair of Functional Materials in Medicine and Dentistry

### Module offered by
Faculty of Medicine

### ECTS
5

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
Integration and binding of active agents in particles, functionalisation of particles for (intracellular) transport processes, targeting and release of the active agents.

### Intended learning outcomes
Students have developed a knowledge of the integration and binding of active agents in particles and of the functionalisation of particles for (intracellular) transport processes, targeting and release of active agents.

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

V (2) + P (1)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) report on practical course (approx. 10 pages) and b) written examination (approx. 90 minutes) or presentation (approx. 30 minutes)

Language of assessment: German and/or English

### Allocation of places
--

### Additional information
--

### Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title: Supramolecular Chemistry (Basics)
Abbreviation: 08-SCM1-152-m01

Module coordinator: Lecturer of lecture "Organischen Chemie"
Module offered by: Faculty of Chemistry and Pharmacy
ECTS: 5
Method of grading: Only after succ. compl. of module(s)
Method of grading: Numerical grade
Duration: 1 semester
Module level: Graduate
Other prerequisites: --

Contents:
German contents available but not translated yet.


Intended learning outcomes:
German intended learning outcomes available but not translated yet.


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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes)
Language of assessment: German and/or English

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>
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<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Microsystems for biological and medicinal Applications</td>
<td>03-SP3A2-152-m01</td>
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**Module coordinator**

holder of the Chair of Functional Materials in Medicine and Dentistry and holder of the Chair of Regenerative Medicine

**Module offered by**

Faculty of Medicine

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

**Contents**

Implantable drug delivery systems, lab-on-a-chip systems for bioanalysis, bioreactor technology, lab course: nanoparticles for regenerative medicine and protein biochemistry.

**Intended learning outcomes**

Students have developed a knowledge of implantable drug delivery systems and lab-on-a-chip systems for bioanalysis, bioreactor technology, nanoparticles for regenerative medicine and protein biochemistry.

**Courses**

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

V (2) + P (1)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) report on practical course (approx. 10 pages) and b) written examination (approx. 90 minutes) or presentation (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
**Module title**  
Polymer Materials 1: Technology of Polymer Modification

**Abbreviation**  
08-PW1-152-m01

**Module coordinator**  
holder of the Chair of Chemical Technology of Material Synthesis

**Module offered by**  
Chair of Chemical Technology of Material Synthesis

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</table>

**Duration**  
1 semester

**Module level**  
graduate

**Other prerequisites**  
--

**Contents**

Methods of polymer synthesis; composition of polymers and polymer compounds; properties of polymers; technologies for the production of polymers compound and polymer components; means of characterisation of polymer compounds and polymer components.

**Intended learning outcomes**

The students possess knowledge of the special properties of polymers and polymer compounds (e.g. time and temperature dependent viscoelastic behaviour). They know the characteristics of important production technologies (methods of polymer synthesis, compounding technologies, processing methods e.g. injection moulding) and understands the different ways of influencing properties of materials and manufactured products. They have knowledge of ways to calculate complex flow conditions in polymer processing machines and tools.

**Courses**

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

V (2) + P (1)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (30 minutes)

Assessment offered: Once a year, winter semester

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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<table>
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<td>programme coordinator of the exchange programme</td>
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<tbody>
<tr>
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</table>

Please consult with course advisory service in advance.

## Contents
The topics covered in this module correspond to the syllabus of the foreign partner university.

## Intended learning outcomes
German intended learning outcomes available but not translated yet.

Die Studierenden erwerben Kompetenzen entsprechend den besuchten Veranstaltungen an der Partneruniversität.

## Courses
No courses assigned to module

## Method of assessment
Assessments as specified by partner university abroad

Language of assessment: German and/or language spoken at partner university abroad

## Allocation of places
--

## Additional information
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## Referred to in LPO I
(Examination regulations for teaching-degree programmes)

--
Thesis

(30 ECTS credits)
### Module Title

**Master-Thesis Biofabrication**

<table>
<thead>
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<tr>
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### Module Coordinator

degree programme coordinator Chemie (Chemistry)  
Chair of Biochemistry

### ECTS

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### Duration

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<td>1 semester</td>
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</table>

### 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

<table>
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<th>Scope</th>
<th>Language — if other than German</th>
<th>Examination offered — if not every semester, information on whether module is creditable for bonus</th>
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<td>written thesis</td>
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### 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>
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<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
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</table>

**Contents**

German contents available but not translated yet.

Wissenschaftliche Verteidigung der Ergebnisse der Master-Thesis.

**Intended learning outcomes**

The student is able to defend the results of her/his Master's Thesis in a scientific discussion.

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

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 is creditable for bonus)

final colloquium (approx. 60 minutes): talk (approx. 30 minutes) with subsequent discussion (approx. 30 minutes)

Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

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