Subdivided 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
Course of Studies - Contents and Objectives

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

Term: \textbf{SS} = summer semester, \textbf{WS} = winter semester

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

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

Other: \textbf{A} = thesis, \textbf{LV} = course(s), \textbf{PL} = assessment(s), \textbf{TN} = participants, \textbf{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:

\textbf{ASPO2015}

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

\textbf{13-Jul-2015 (2015-21)}

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 \textbf{FSB} (subject-specific provisions) and \textbf{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 \textbf{FSB}/\textbf{SFB} shall prevail.
The subject is divided into

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<td>holder of the Chair of Functional Materials in Medicine and Dentistry</td>
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<td>1 semester</td>
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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, 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

A (no information on weekly contact hours available)

### Method of assessment

(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

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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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**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

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<tr>
<th><strong>Method of assessment</strong></th>
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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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## Module Catalogue for the Subject Biofabrication

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

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<td>Physical chemistry of supramolecular assemblies</td>
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### 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

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### Contents

German contents available but not translated yet.

Das Modul betrachtet im Detail die grundlegenden Wechselwirkungen zwischen Molekülen. Es werden Bildung und physikalische-chemische Eigenschaften von Aggregaten besprochen. Wichtige Anwendungen supramolekularer Chemie werden thematisiert.

### 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 (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 (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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Module title | Abbreviation
---|---
Fundamentals of Tissue Engineering and Quality Management | 03-SP1A2-152-m01

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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>
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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 can be chosen to earn a 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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### BioFab Research-Thesis 1

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<td>chairperson of examination committee Biofabrikation (Biofabrication)</td>
<td>Chair of Biochemistry</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 can be chosen to earn a 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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#### Referred to in LPO I (examination regulations for teaching-degree programmes)

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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 can be chosen to earn a 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**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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### 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 the 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 can be chosen to earn a 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)
--
### 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 can be chosen to earn a 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)

--
### Module Catalogue for the Subject Biofabrication

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

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

**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

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
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</tbody>
</table>

**Duration**

- 1 semester

**Module level**

- graduate

**Other prerequisites**

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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 can be chosen to earn a 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)

--
**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**
umerical 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 can be chosen to earn a 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)
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<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Master-Thesis Biofabrication</td>
<td>08-MBF-MT-152-m01</td>
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<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>degree programme coordinator Chemie (Chemistry)</td>
<td>Chair of Biochemistry</td>
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<th>ECTS</th>
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<th>Duration</th>
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<tr>
<td>1 semester</td>
<td>graduate</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** (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 can be chosen to earn a bonus)

written thesis (approx. 60 pages)
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>
<thead>
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<tbody>
<tr>
<td>Final Colloquium</td>
<td>08-MBF-KOLL-152-m01</td>
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</table>

<table>
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<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>Dean of Studies Funktionswerkstoffe (Functional Materials)</td>
<td>Chair of Biochemistry</td>
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<td>graduate</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 can be chosen to earn a 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**

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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
Courses at the partner university (BioFab Master)

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<tr>
<th>ECTS</th>
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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>30</td>
<td>numerical grade</td>
<td>Only after succ. compl. of module(s)</td>
</tr>
</tbody>
</table>

Duration
1 semester

Module level
undergraduate

Module coordinator
programme coordinator of the exchange programme

Module offered by
Faculty of Chemistry and Pharmacy

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 (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 can be chosen to earn a bonus)
Assessments as specified by partner university abroad
Language of assessment: German and/or language spoken at partner university abroad

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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