International Semester SS19\(^{(1)}\)

Furtwangen University Campus Schwenningen

course program\(^{(2)}\):  

**Biomedical and Life Sciences**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPT 10038</td>
<td>Molecular biology and genetic engineering lab</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>FH 26391</td>
<td>Developments in Nanomedicine</td>
<td>3 ECTS</td>
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**Engineering Sciences**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>BPT 20068</td>
<td>Bioprocess Engineering Seminar</td>
<td>2 ECTS</td>
</tr>
<tr>
<td>BPT 10037</td>
<td>Bioprocess Engineering Laboratory</td>
<td>4 ECTS</td>
</tr>
<tr>
<td>FH 26268</td>
<td>Control Systems and Actuators</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>FH 26220</td>
<td>Plasma Thin Film Technology</td>
<td>3 ECTS</td>
</tr>
<tr>
<td>FH 26570</td>
<td>Internet of Things Software</td>
<td>3 ECTS</td>
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**Management competencies**

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<tr>
<th>Course</th>
<th>Title</th>
<th>ECTS</th>
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<tbody>
<tr>
<td></td>
<td>Several courses of the Business School</td>
<td>X ECTS</td>
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**Further components of the International Semester**

<table>
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<tr>
<th>Course</th>
<th>Title</th>
<th>ECTS</th>
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<tbody>
<tr>
<td></td>
<td>German language classes</td>
<td>6 ECTS</td>
</tr>
<tr>
<td></td>
<td>Team student project (optional)</td>
<td>6 ECTS</td>
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\(^{(1)}\) for more information see [come-to.hs-furtwangen.de](http://come-to.hs-furtwangen.de)  

\(^{(2)}\) subject to modifications

**Further components in German:**

International students are welcome to choose courses of the bachelor programs offered in German at the Campus Schwenningen.
**BPT 10037 Bioprocess Engineering Laboratory**

Instructor: Prof. Dr. Volker Hass, Prof. Dr. Holger Schneider

**Description:**
- Implement production processes on a pilot scale (Examples: yeast production; ethanol production, bio refinery processes); Production of culture media; Cultivation in stirred tank bioreactors; Product processing;
- Process analytics, automation and monitoring
- Simulation: Dynamic (training) simulation of cultivation methods and rectification processes.

**Prerequisites:** The modules of Process Engineering, Unit Operations 2, Chemistry 3 and Biology 3 from the third semester, or equivalent knowledge and skills.

**Required Corequisites:** Bioprocess Engineering Seminar (BPT 20068). The course contents and outcomes of BPT 10037 and BPT 20068 form one complete module. The two courses must be completed simultaneously.

**BPT 20068 Bioprocess Engineering Seminar**

Instructor: Prof. Dr. Volker Hass, Prof. Dr. Holger Schneider

**Description:**
Planning and dimensioning of biotechnical production processes and experiments; Study of literature, description of processes and experiments; Simulation; Evaluation, mass and energy balances, process kinetics, assessment of dynamic process information, documentation and presentation

**Prerequisites:** The modules of Process Engineering, Unit Operations 2, Chemistry 3 and Biology 3 from the third semester curriculum, or equivalent knowledge and skills.

**Required Corequisites:** Bioprocess Engineering Lab (BPT 10037). The course contents and outcomes of BPT 10037 and BPT 20068 form one complete module. The two courses must be completed simultaneously.

**FH 26268 Control Systems and Actuators**

Instructor: Prof. Dr. Ing. Gunther Ketterer

**Description:**
The following main topics will be covered:
- Modeling and system theory, differential equation development
- Modeling of coupled spring-damped mass systems
- Modeling of drive systems
- Transfer functions and block diagrams,
- Laplace transformation and transfer functions,
- Step response, impulse response,
- Open and closed loop systems
- Poles and zeros, stability
- Hurwitz stability criteria
- Frequency domain and BODE diagram, transfer locus
- Nyquist
- Controller design and development with root locus
- System identification and controller Optimization

**Prerequisites:** Mathematics, physics
**FH 28919 Developments in Nanomedicine**
(Lc, S / 3 ECTS / weekly)
Instructor: Prof. Dr. Hans-Peter Deigner

**Description:** Use, application and development of nanomaterial and nanoparticles in diagnostics and therapy; toxicity of nanoparticles and interaction with tissue and organisms; applications in the clinic.
Students will also prepare own contributions to various aspects; final written exam 60 min.

**Prerequisites:** Knowledge and interest in cell biology, chemistry and medical applications; willingness to actively contribute.

**FH 26570 Internet of Things Software**
(Lc, Lab, Tu / 3 ECTS / weekly)
Instructor: Prof. Dr. Edgar Seemann

**Description:**
The following main topics will be covered:
1. Introduction to IOT Systems (Hardware platforms, Computer networks)
2. Configuration and management of IOT devices (Working with IOT operating systems, programmatic control of IO ports)
3. Programming (Programming languages for IOT applications)
4. Network communication (Network and IOT protocols)
5. Client-Server applications (Implementation of Client-Server applications, web-based user interfaces, REST APIs, data management)

**Prerequisites:** Familiarity with established programming techniques

**BPT 10038 Molecular biology and genetic engineering lab**
(S, Lab / 3 ECTS / block course)
Instructor: Prof. Dr. Ulrike Salat and B.Sc. Tanja Paatsch

**Description:** Lab work in molecular biology and genetic engineering. Strategies and methods of cloning technologies. Recombinant expression of proteins in E. coli.

**Prerequisites:** Lab experiences, at least 4 Semester lab courses. Basic knowledge in molecular biology, microbiology and cell biology.

**IEB 26220 Plasma Thin Film Technology**
(Lc, Lab, sdL / 3 ECTS / weekly)
Instructor: Prof. Dr. Volker Bucher

**Description:** Basics of vacuum, plasma and thin films (Hard coatings for tools, functionalization of medical products. Elective Course in English for international students and students interested in an English lecture

**Prerequisites:** Basics in Physics, Chemistry

**Recommended co-requisites:** Basics in material science

**Important note:** The lecture will be given in German, but all material, exercises and the exam are available in English

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TBA: to be announced

Lc: Lectures
S: Seminar
Lab: Lab/Practical
Tu: Tutorials
sdL: self-directed Learning
OC: Online-Course

1 ECTS = 25 – 30 hours workload altogether