<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Name</th>
<th>Lecturer in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-1.1</td>
<td>Concepts of Molecular Modelling</td>
<td>Prof. Cuniberti</td>
</tr>
</tbody>
</table>

**Contents and Objectives**
The students know the fundamentals of the theoretical description of elements of nanophysics, focused on: quantum mechanics, normal vibrations, molecular dynamics simulation and Monte-Carlo methods. They know the mathematical approaches and the numerical methods for the characterization of molecules and can model them in computer programs.

**Models of Teaching and Learning**
The module contains 2 hours per week lectures, 2 hours per week exercises, 2 hours per week practical training and self-study.

**Prerequisites**
Knowledge of the fundamentals of mathematics (Analysis and Linear Algebra) and physics (classical mechanics) on Bachelor-Level.

**Usability**
The module is a compulsory module in the Master programs “Nano-Biophysics” and “Organic and Molecular Electronics”.

**Requirements for Acquiring Credit Points**
The credit points are awarded when the module assessment is passed. The module assessment consists of a written exam in length of 90 minutes, if the number of participants exceeds 10 (1. Assessment) and a project work (2. Assessment). With up to 10 participants, the written exam (1. Assessment) is replaced by an oral exam as individual exam worth 20 minutes. The nature of the specific exam is announced to the students at the end of the registration period in written form.

**Credit Points and Grades**
9 credit points can be obtained by the module. The module grade is the arithmetic average of the grades of the examinations. (Passing of the module provides that the oral examinations has been passed)

**Frequency**
The module will be offered every winter term.

**Work Load**
The total effort is 270 hours

**Duration**
The module takes one semester.
<table>
<thead>
<tr>
<th><strong>Module Number</strong></th>
<th><strong>Module Name</strong></th>
<th><strong>Lecturer in Charge</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-1.2</td>
<td>Semiconductor Technology</td>
<td>Prof. Bartha</td>
</tr>
</tbody>
</table>

**Contents and Objectives**

The module contains the technological basics for the fabrication of micro- and nano-devices, as well as the manufacturing concepts for integrated circuits.

Objectives:

The students are enabled to
- Know the function of the process steps for the fabrication of micro- and nano devices
- Know the fundamental principles for the fabrication and miniaturization of devices and integrated circuits
- Know the interrelation of the individual process steps to complex process schemes

**Models of Teaching and Learning**

The module consists of 6 hours per week lectures, 1 hour per week practical training and self-study.

**Prerequisites**

**Usability**

The module is a compulsory module in the Master programs “Nanoelectronic Systems” and “Organic and Molecular Electronics”.

**Requirements for Acquiring Credit Points**

The credit points are awarded when the module assessment is passed. The module assessment consists of a written exam in the amount of 120 minutes.

With up to 50 participants, the written exam is replaced by an individual oral examination of 20 minutes duration. The nature of the specific exam is announced to the students in written form at the end of the registration period.

**Credit Points and Grades**

10 credit points can be obtained by the module. The module grade is the grade of the examination.

**Frequency**

The module will be offered every year, beginning in winter term.

**Work Load**

The total effort is 300 hours.

**Duration**

The module takes 2 semesters.
<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Name</th>
<th>Lecturer in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-1.3</td>
<td>Organic Semiconductors</td>
<td>Prof. Malte Gather</td>
</tr>
</tbody>
</table>

**Contents and Objectives**

**Contents:**
- fundamental properties:
  - Chemical bonds, hybridization
- optical properties
- electronical properties
- doping
- comparison to classical semiconductors
- concepts for devices

**Objectives:**
The students have basic- and special knowledge about organic semiconductors and can apply them. Furthermore, the students know about the state-of-the art in this and related fields.

**Models of Teaching and Learning**
The module consists of 2 hours per week seminar, 2 hours per week lecture and self-study.

**Prerequisites**

**Usability**
The module is a compulsory part of the Master program „Organic and Molecular Electronics“.

**Requirements for Acquiring Credit Points**
The credit points are awarded if the module assessment is passed. The module assessment consists of a written exam (duration 90 minutes) and a non-graded presentation.

**Credit Points and Grades**
5 credit points can be obtained in this module. The module grade is the grade of the written exam. §11 par. 1, sentence 5 of the examination regulations remains unaffected.

**Frequency**
The module will be offered every year, beginning in winter term.

**Work Load**
The total effort is 150 hours.

**Duration**
The module takes two semesters.
<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Name</th>
<th>Lecturer in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-1.4</td>
<td>Basics Module</td>
<td>Dean of Studies</td>
</tr>
</tbody>
</table>

### Contents and Objectives

The students have a command of basic knowledge required for OME Master program that has not been taught in their respective Bachelor programs. This may concern knowledge in solid state- and semiconductor physics, general and organic chemistry or the basics of circuit technology.

### Models of Teaching and Learning

The student choses courses in the amount of 4 basic points from the catalogue „Basics“, which will be published including the distinct examinations at the beginning of the term.

### Prerequisites

**Usability**

The module is a compulsory module of the Master program „Organic and Molecular Electronics“. The command of the contents is a precondition for the participation of module OME-E2.

### Requirements for Acquiring Credit Points

The credit points are awarded when the module assessment is passed. The module assessment consists of the examinations given in the catalogue „Basics“.

### Credit Points and Grades

14 credit points can be obtained in this module. The module grade is the arithmetic average of the grades of the examinations.

### Frequency

The module will be offered every winter semester.

### Work Load

The total effort is 420 hours.

### Duration

The module takes one Semester.
<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Name</th>
<th>Lecturer in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-2.1</td>
<td>Soft Condensed Matter Theory</td>
<td>Prof. Sommer</td>
</tr>
</tbody>
</table>

**Contents and Objectives**

Theoretical principals of soft matter physics  
Theory of phase transition, statistical models  
Liquid crystals: principles, ordered phases, statistical models  
Polymers: ideal polymer chains, excluded volume, states of polymer systems, dynamics, charge effects  
Biological polymer systems: DNA and proteins, interaction of DNA and proteins - Lactose Operon in Escherichia Coli, Chromatin

The students have a command of the basics of soft condensed matter physics which are recommended for further education in biophysics and polymer physics.

**Models of Teaching and Learning**
The module takes 3 hours per week lectures, 1 hour per week exercises and self-study.

**Prerequisites**
Solid basics in physics (thermodynamics, statistical physics, quantum mechanics, electrodynamics) and mathematics (differential- and integral calculus with several variables, vector analysis).

**Usability**
The module is a compulsory module of the Master program „Organic and Molecular Electronics“.

**Requirements for Acquiring Credit Points**
The credit points are awarded when the module assessment is successfully completed. The module assessment consists of two written take home exams with a one-week deadline each.

**Credit Points and Grades**
5 credit points can be obtained by the module. The module grade is the grade of the examination.

**Frequency**
The module will be offered every summer semester

**Work Load**
The total effort is 150 hours

**Duration**
The module takes one semester
**Module Number** | **Module Name** | **Lecturer in Charge**
---|---|---
OME-2.2 | Optoelectronics | Prof. Leo

**Contents and Objectives**

The module covers the interaction of electromagnetic waves with condensed matter structures. This includes the propagation of EM-waves in layer structures, optical properties of condensed matter and the generation of charge carriers. The knowledge is applied to solar energy conversion; a particular focus is on the photovoltaic effect and its application in solar cells.

The students have a command of the basic concepts of optoelectronics and can apply them to the development of devices.

**Models of Teaching and Learning**
The module consists of 4 hours per week lecture and self-study.

**Prerequisites**

**Usability**
The module is a compulsory module of the Master program „Organic and Molecular Electronics“.

**Requirements for Acquiring Credit Points**
The credit points are awarded if the module assessment is passed. The module assessment consists of a written exam with a duration of 90 minutes.

**Credit Points and Grades**
6 credit points can be obtained in this module. The module grade is the grade of the examination.

**Frequency**
The module will be offered every summer semester.

**Work Load**
The total effort is 180 hours.

**Duration**
The module takes one semester.
<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Name</th>
<th>Lecturer in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-3.1</td>
<td>Molecular Electronics</td>
<td>Prof. Cuniberti</td>
</tr>
</tbody>
</table>

**Contents and Objectives**
The students know the basics of molecular electronics with emphasis on: experimental methods, physical effects and theoretical tools, such as single molecule electronics, raster probe and break-junction techniques, transport mechanisms at the nanoscale, molecular components (diodes, transistors, sensors) and molecular architectures. The students know the most important experimental and theoretical methods of investigation of charge transport at the molecular scale.

**Models of Teaching and Learning**
The module consists of 2 hours per week lectures, 2 hours per week exercises and self-study.

**Prerequisites**
The module consists of 2 hours per week lectures, 2 hours per week exercises and self-study.

**Usability**
The module is an elective module of the Master program “Nanoelectronic Systems” and a compulsory module of the Master program “Organic and Molecular Electronics”.

**Requirements for Acquiring Credit Points**
The credit points are awarded when the module assessment is passed. The module assessment consists of a written exam in the amount of 90 minutes, if the number of participants exceeds 10. With up to 10 participants the written exam will be replaced by an oral exam as individual exam worth 20 minutes. The nature of the specific exam is announced to the students at the end of the registration period in written form.

**Credit Points and Grades**
6 credit points can be obtained by the module. The module grade is the grade of the examination.

**Frequency**
The module will be offered every winter semester.

**Work Load**
The total effort is 180 hours.

**Duration**
The module takes one semester.
<table>
<thead>
<tr>
<th><strong>Module Number</strong></th>
<th><strong>Module Name</strong></th>
<th><strong>Lecturer in Charge</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-3.2</td>
<td>Materials for Nanoelectronics and Printing Technology</td>
<td>Prof. Richter</td>
</tr>
</tbody>
</table>

**Contents and Objectives**

The module contains:
The materials fundamentals for nanoelectronics and the fundamentals of printing technology

Objectives:
The students are enabled basing on the knowledge of
- the assembly, the properties, the fabrication methods and the structure formation of materials as well as
- the effects and the basic types of nanoelectronic structures to conclude the possibilities and the challenges of nanoelectronic material systems.
The students are qualified to
- derive printing technological complexities from the knowledge of different types of printing methods
- substantiate adequate printing methods for different tasks

**Models of Teaching and Learning**
The module takes 4 hours per week lectures, 2 hours per week practical training and self-study.

**Prerequisites**

The module is a compulsory module of the Master program “Organic and Molecular Electronics”.

**Requirements for Acquiring Credit Points**
The credit points are awarded when the module assessment is passed. The module assessment consists of two written exams in the amount of 90 minutes for each and a collection of practical protocols, if the number of participants exceeds 20. With up to 20 participants, the written exams will be replaced by an oral exam as an individual exam worth 30 minutes. The natures of the specific exams are announced at the end of the registration period in written form.

**Credit Points and Grades**
7 credit points can be obtained by the module. The module grade is the both grades of the examinations weighted by 40% each and the grade of the collection of lab protocols weighted by 20%.

**Frequency**
The module will be offered every winter semester

**Work Load**
The total effort is 210 hours.

**Duration**
The module takes one semester
### Contents and Objectives

The module deals with physical analysis methods that are and will be applied for the characterization in organic electronics, such as semiconductors, metals, glasses and organic materials. The meaning of the characterization of materials and processes for the functionality, capability and reliability is included. Also, the complexity of device-design, technology, materials and analytics is discussed.

The students know several techniques for the characterization of thin organic and organic-inorganic films. They have a command of theoretical basics of physical analysis techniques and their applications in characterizing thin films, film systems and interfaces. The students are enabled to use a number of methods in experiments.

### Models of Teaching and Learning

The module consists of 2 hours per week lectures, 2 hours per week practical training (as a block-course in the lecture-free period) und Self-study.

### Prerequisites

Command of physics on Bachelor level, in particular classical and solid state physics.

### Usability

The module is a compulsory module des Master program „Organic and Molecular Electronics“.

### Requirements for Acquiring Credit Points

The credit points are awarded when the module assessment is passed. The module assessment consists of a Written exam in the amount of 90 minutes and the lab protocol.

### Credit Points and Grades

5 credit points can be obtained by the module. The module grade is the average of the grades of the examinations.

### Frequency

The module will be offered every winter semester.

### Work Load

The total effort is 150 hours.

### Duration

The module takes one semester.
Contents and Objectives

Contents:
Research, development, modeling, analysis, planning in organic electronics and related fields.

Objectives:
The students have expertise in handling complex problems in modern scientific professional practice and to document and present their results. They have social skills of professional communication, project and product management.

Models of Teaching and Learning
The module includes projects amounting to 200 hours and self-study.

Prerequisites

Usability
The module is a compulsory module of the Master program “Organic and Molecular Electronics”.

Requirements for Acquiring Credit Points
The credit points are awarded when the module assessment is passed. The module assessment consists of the project work.

Credit Points and Grades
8 credit points can be obtained by the module. The module grade is the grade of the examination.

Frequency
The module will be offered every year, beginning in summer term.

Work Load
The total effort is 240 hours.

Duration
The module takes two semesters.
<table>
<thead>
<tr>
<th>Module Number</th>
<th>Module Name</th>
<th>Lecturer in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>OME-E2</td>
<td>Specialization Module</td>
<td>Dean of Studies</td>
</tr>
</tbody>
</table>

**Contents and Objectives**
The students have a good command of relevant questions and developments in fields of organic and molecular electronics that they have chosen by themselves. The students gain an in-depth knowledge of the selected research fields. They will have a general overview of the chosen areas of research and know about the latest developments within these subjects. Within the first semester, the students will be able to make an adequate decision regarding the topic of the project work and after finishing the module, they will be able to make an adequate decision regarding the topic of the Master thesis.

**Models of Teaching and Learning**
The students chose courses amounting to 5 basic points from the catalogue „Specials“, which is published along with the distinct assessments at the beginning of the semester.

**Prerequisites**
Knowledge of chemistry, physics and circuit technology as taught for instance in the „Basics Module“.

**Usability**
The module is a compulsory module of the Master program „Organic and Molecular Electronics“.

**Requirements for Acquiring Credit Points**
The credit points are awarded if the module assessment is passed. The module assessment consists of the examinations given in the catalogue „Specials“.

**Credit Points and Grades**
15 credit points can be obtained by the module. The module grade is the average of the grades of the examinations.

**Frequency**
The module will be offered every year, beginning in the summer term.

**Work Load**
The total effort is 450 hours.

**Duration**
The module takes two semesters.