## Modules for Environmental Modelling

### Mastermodule

**inf501 - Environmental Information Systems**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Environmental Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>inf501</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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<td>Used in course of study</td>
<td><a href="#">Master Informatik &gt; Angewandte Informatik</a></td>
</tr>
<tr>
<td></td>
<td><a href="#">Master Umweltmodellierung &gt; Mastermodule</a></td>
</tr>
<tr>
<td></td>
<td><a href="#">Master Wirtschaftsinformatik &gt; Bereichswahlmodule</a></td>
</tr>
<tr>
<td>Contact person</td>
<td>Ute Vogel-Sonnenschein</td>
</tr>
<tr>
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<td>Die im Modul Lehrenden</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>Ute Vogel-Sonnenschein</td>
</tr>
<tr>
<td></td>
<td>Die im Modul Lehrenden</td>
</tr>
</tbody>
</table>

**Entry requirements**

**Skills to be acquired in this module**

The module gives an overview of the phases and important aspects of the environmental information processing.

**Professional competence**

The students:

- apply basic processing algorithms to classify and process data
- compare, evaluate and design data structures to store spatial data efficiently
- apply basic functions of a geo-information system
- describe, evaluate and apply basic processes of data mining
- describe, evaluate and apply basic geostatistics processes
- evaluate and apply multicriteria decision making processes

**Methodological competence**

The students:

- use geoinformation systems for environmental appliccation
- use data mining tools for data analysis

**Social competence**

The students:

- solve tasks in teams of 2-3 students
- present and discuss their solutions in class

**Self-competence**

The students:

- reflect their own behaviour with regard to the methods of environmental informatics

**Module contents**

Content of the Module: Environmental information systems make information about the general environmental state available for public management and public facilities, enterprises or interested citizens. The collection, storage and evaluation of this information is interesting for computer science.

Within the scope of the lecture we will examine the processing of environmental information step-by-step, this means:

- problems of data acquisition and data processing,
- data structures and database concepts for an efficient access to (usually) spatial data,
- introduction of data analysis (in particular from geostatistics and data mining),
- introduction of multicriteria decision processes, as well as
- the supply of data supported by meta data.
The module "Umweltinformationssysteme" is accompanied by the module "Modellbildung in Simulation ökologischer Systeme". The subjects of "Modellbildung in Simulation ökologischer Systeme" represent the dynamic aspects of environmental systems (mainly of ecological systems). Nevertheless, the modules can be taken independently from each other.

### Reader’s advisory

### Links
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Reference text: Associated with the module:
  - **inf500 Modellbildg. und Sim. ökol. Systeme**

### Module level
- AS (Akzentsetzung / Accentuation)

### Modulart
- je nach Studiengang Pflicht oder Wahlpflicht

### Lern-/Lehrform / Type of program
- Vorkenntnisse / Previous knowledge:
  - Informationssysteme I
  - Grundlagen der Statistik

### Examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>Second and third week after the end of the lecture period - retake before the upcoming lecture period</td>
<td>Oral exam</td>
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### Course type

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>3.00</td>
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<td>42 h</td>
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<td>Exercises</td>
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<td>1.00</td>
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<td>14 h</td>
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### Total time of attendance for the module
56 h
# inf510 - Energy Information Systems

<table>
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<tr>
<th>Module label</th>
<th>Energy Information Systems</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>inf510</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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</table>

**Used in course of study**

- Master Engineering Physics > Schwerpunkt: Renewable Energies
- Master Informatik > Angewandte Informatik
- Master Umweltmodellierung > Mastermodule
- Master Wirtschaftsinformatik > Bereichswahlmodule

**Entry requirements**

**Skills to be acquired in this module**

- The students will learn different approaches to integrate distributed facilities, the regulatory framework, relevant standards and architecture concepts of energy management systems and will be able to apply this knowledge.

**Professional competence**

The students:

- develop and evaluate IT-architectures for energy management systems
- model objects of this domain appropriately
- model energy information systems
- realise and differentiate advanced tasks of decentralised energy management systems

**Methodological competence**

The students:

- identify problems of energy management, analyse these problems systematically and provide solutions
- apply different simulation approaches of decentralised plants and consumers

**Social competence**

The students:

- discuss solutions for energy management systems in the group
- develop use cases in teams
- present self-developed solutions

**Self-competence**

The students:

- reflect their actions with regard to structuring and decomposing systems
- reflect their own use of power as a limited resource

**Module contents**

This module provides the computer science basics for energy management. It provides the requirements of energy supply information systems with the focus on technical components and the requirements of decentralised and renewable energy plants.

These are:

- Architectures for energy information systems, e.g. SOA, Seamless Integration Architecture (IEC TC 57), OPC-UA
- Norms and standards of energy industry data models (CIM, 61850)
- Systematisation of energy information system requirements based on ontologies
- Development, analysis and adaption of energy industry reference models and processes
- Methods and technologies to support energy industry processes
- Methods and algorithms to support decision processes of the decentralised energy plants control
- Smart Grid plant communication, particularly for load management
- Methods for modelling and simulation of power supply system dynamics
Reader’s advisory

- Crastan V.: “Elektrische Energieversorgung II”, Springer 2004

Links

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>jährlich</td>
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<tr>
<td>Module capacity</td>
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<tr>
<td>Module level</td>
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<tr>
<td>Modulart</td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>At the end of the semester</td>
<td>Student research project or presentation</td>
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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<td>Seminar</td>
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<td>2.00</td>
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<td>WiSe</td>
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</table>
inf511 - Smart Grid Management

Module label                  Smart Grid Management
Module code                  inf511
Credit points                6.0 KP
Workload                     180 h

Used in course of study
- Master Engineering Physics > Schwerpunkt: Renewable Energies
- Master Informatik > Angewandte Informatik
- Master Umweltmodellierung > Mastermodule
- Master Wirtschaftsinformatik > Bereichswahlmodule

Contact person
Module responsibility
- Sebastian Lehnhoff
- Die im Modul Lehrenden

Authorized examiners
- Sebastian Lehnhoff
- Die im Modul Lehrenden

Entry requirements
Skills to be acquired in this module

After successful completion of the course the students should be able to understand the existing structures and technical basis of energy systems to produce, transfer and distribute electricity and their interaction and dependency on each other. They should have developed an understanding for necessary IT- and process control technology components, methods and processes to control and operate electrical energy systems. The students are able to estimate and evaluate the requirements and challenges of ICT and computer science which are caused by the development and integration of unforeseeable fluctuations of decentralised plants. The students will be able to estimate the influence of distributed control concepts and algorithms for decentralised plants and consumers in the so called Smart Grid energy systems. Regarding the requirements the students will be able to analyse the safety, reliability, realtime capability and flexibility of Smart Grid energy systems.

Professional competence
The students:
- understand the existing structures and the technical basis of energy systems producing, transferring and distributing electricity and their interaction and dependency on each other.
- develop an understanding for necessary IT- and process control technology components, methods and processes to control and operate electrical energy systems.
- estimate and evaluate the requirements and challenges of ICT and computer science which are caused by the development and integration of unforeseeable fluctuations of decentralised plants.
- estimate the influence of distributed control concepts and algorithms for decentralised plants and consumers in the so called Smart Grid energy systems.

Methodological competence
The students:
- analyse the safety, reliability, realtime capability and flexibility of Smart Grid energy systems
- use advanced mathematical methods to calculate networks

Social competence
The students:
- create solutions in small teams
- discuss their solutions

Self-competence
The students:
- reflect their own use of electricity as a limited resource

Module contents
Content of the Module: In this course information technology, economical energy industry and technical basic knowledge and methods are analysed by using concrete Smart Grid approaches. The basic calculation methods for an intelligent grid management are introduced.

This module deals with the technical and economical framework for a permissible electrical network as well as mathematical modelling and calculation methods to analyse conditions of electrical energy networks (in
stationary conditions).
These are:

- The organisation of the EU energy market (regulatory framework, responsibility in liberalisation of electrical energy systems)
- Establishment and operation of electrical energy supply networks (network topology, statutory duties of supply, supply quality/system services, malfunctions and protection systems)
- Intelligent network management (Smart Grids), aggregation forms, machine learning approaches)

Reader's advisory

Suggested reading:

- Crastan V.: "Elektrische Energieversorgung II", Springer 2004

Links

Language of instruction  German
Duration (semesters)  1 Semester
Module frequency  jährlich
Module capacity  unlimited
Module level  AS (Akzentsetzung / Accentuation)
Moduleart  je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination  Time of examination  Type of examination
Final exam of module  At the end of the semester  Oral exam

Course type  Comment  SWS  Frequency  Workload attendance
Lecture  3.00
Exercises  1.00

Total time of attendance for the module  56 h
inf535 - Computational Intelligence I

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<td>Module code</td>
<td>inf535</td>
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<tr>
<td>Credit points</td>
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<tr>
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<th>Module responsibility</th>
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<tbody>
<tr>
<td></td>
<td>Oliver Kramer</td>
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<td>Die im Modul Lehrenden</td>
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<td>Oliver Kramer</td>
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<thead>
<tr>
<th>Entry requirements</th>
<th>Skills to be acquired in this module</th>
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<tbody>
<tr>
<td>Professional competence</td>
<td>Accepts and adapts</td>
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<tr>
<td></td>
<td>analytically the selection of methods</td>
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<tr>
<td></td>
<td>deepens previous knowledge</td>
</tr>
<tr>
<td></td>
<td>of analysis and linear algebra</td>
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Methodological competence
The students:
- deepen programming skills
- apply modelling skills
- learn about the relation between problem class and method selection

Social competence
The students:
- cooperatively implement content introduced in lecture
- evaluate own solutions and compare them with those of their peers

Self-competence
The students:
- evaluate own skills with reference to peers
- realize personal limitations
- adapt own problem solving approaches with reference to required method competences

<table>
<thead>
<tr>
<th>Module contents</th>
<th>Computational Intelligence comprises intelligent and adaptive methods for optimisation and learning. The module &quot;Computational Intelligence I&quot; concentrates on methods for evolutionary optimisation and heuristic approaches. The exercises introduce and deepen practical aspects of the implementation and algorithmic design, also taking into account application aspects.</th>
</tr>
</thead>
</table>
| Overview of Content: | foundations of optimisation
|                  | genetic algorithms and evolution strategies
|                  | parameter control and self-adaptation
|                  | runtime analysis
|                  | swarm algorithms
|                  | constrained optimisation
|                  | multi-objective optimisation
|                  | meta-modeling

|-------------------|----------------------------------------------------------------------------------|

Links

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<tr>
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<td>Duration (semesters)</td>
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<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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<th>- Grundlagen der Statistik</th>
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<td>Vorkenntnisse / Previous knowledge</td>
<td>- Grundlagen der Statistik</td>
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<th>Type of examination</th>
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<tr>
<td>Final exam of module</td>
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<td>Written or oral exam</td>
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<th>Workload attendance</th>
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<td>Lecture</td>
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<td>Exercises</td>
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| Total time of attendance for the module | 56 h |
## inf536 - Computational Intelligence II

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<td><strong>Module code</strong></td>
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<tr>
<td><strong>Workload</strong></td>
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**Used in course of study**
- Master Engineering of Socio-Technical Systems > Embedded Brain Computer Interaction
- Master Informatik > Angewandte Informatik
- Master Umweltmodellierung > Mastermodule

**Contact person**
- Module responsibility
  - Oliver Kramer
- Authorized examiners
  - Die im Modul Lehrenden
  - Oliver Kramer

**Entry requirements**

**Skills to be acquired in this module**

**Professional competence**
The students:
- Recognise machine learning problems
- Implement simple algorithms of machine learning
- Critically discuss solutions and selection of methods
- Deepen previous knowledge of analysis and linear algebra

**Methodological competence**
The students:
- Deepen programming skills
- Apply modelling skills
- Learn about the relation between problem class and method selection

**Social competence**
The students:
- Cooperatively implement content introduced in lecture
- Evaluate own solutions and compare them with those of their peers

**Self-competence**
The students:
- Evaluate own skills w.r.t. peers
- Realise personal limitations
- Adapt own problem solving approaches w.r.t. required method competences

**Module contents**
Computational Intelligence comprises intelligent and adaptive methods for optimisation and learning. The module "Computational Intelligence II" concentrates on methods for machine learning and data mining. The exercises introduce and deepen practical aspects of the implementation and algorithmic design, also taking into account application aspects.

**Overview of Content:**
- Foundations of learning and classification
- Nearest neighbouring methods
- Model selection and parameter tuning
- Regression
- Support vector and kernel methods
- Clustering
- Dimensionality reduction

**Reader's advisory**
- HASTIE, T., TIBSHIRANI, R., FRIEDMAN, J.H.: The Elements of Statistical Learning, Springer 2009
### Links

**Languages of instruction**  
German, English

**Duration (semesters)**  
1 Semester

**Module frequency**  
once a year

**Module capacity**  
unlimited

**Modullevel**  
AS (Akzentsetzung / Accentuation)

**Modulart**  
Pflicht o. Wahlpflicht / compulsory or optional

**Lern-/Lehrform / Type of program**  
V+Ü

**Vorkenntnisse / Previous knowledge**  
- inf535 Computational Intelligence I  
- Statistics

### Examination

<table>
<thead>
<tr>
<th>Examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
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<td>Written or oral exam</td>
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### Course type

<table>
<thead>
<tr>
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<tr>
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<td>2.00</td>
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### Total time of attendance for the module

56 h
inf651 - Environmental Management Information Systems I

<table>
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<th>Module label</th>
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<tr>
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<td>inf651</td>
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<td>Workload</td>
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<tr>
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<td>Master Informatik &gt; Angewandte Informatik</td>
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<tr>
<td>Master Sustainability Economics and Management &gt; Ergänzungsmodule</td>
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<tr>
<td>Master Umweltmodellierung &gt; Mastermodule</td>
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<td>Master Wirtschaftsinformatik &gt; Akzentsetzungsmodule Bereich Wirtschaftsinformatik</td>
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<tr>
<td>Contact person</td>
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<tr>
<td>Module responsibility</td>
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</tr>
<tr>
<td>• Jorge Marx Gomez</td>
<td></td>
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<td>• Die im Modul Lehrenden</td>
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<tr>
<td>Authorized examiners</td>
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<td>• Jorge Marx Gomez</td>
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<td>• Die im Modul Lehrenden</td>
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<tr>
<td>Entry requirements</td>
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</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>This module completes the knowledge and abilities gained in the field of Environmental Informatics and it creates a strong reference to up to date topics in the field of sustainability. The content taught in this module can directly be applied in an upcoming study and professional career.</td>
</tr>
<tr>
<td>Professional competence</td>
<td>The students:</td>
</tr>
<tr>
<td>• are able to classify and explain the sustainability paradigm</td>
<td></td>
</tr>
<tr>
<td>• are aware of the current status of sustainability reporting</td>
<td></td>
</tr>
<tr>
<td>• are able to define and to model material flows</td>
<td></td>
</tr>
<tr>
<td>• have obtained know-how in the field of corporate environmental management information systems (CEMIS)</td>
<td></td>
</tr>
<tr>
<td>Methodological competence</td>
<td>The students:</td>
</tr>
<tr>
<td>• implement CEMIS</td>
<td></td>
</tr>
<tr>
<td>• apply different techniques and methods to case studies</td>
<td></td>
</tr>
<tr>
<td>• develop new case studies in teams</td>
<td></td>
</tr>
<tr>
<td>Social competence</td>
<td>The students:</td>
</tr>
<tr>
<td>• are supposed to work in teams and therefore have to identify working packages and have to take on responsibility for the jobs assigned to them</td>
<td></td>
</tr>
<tr>
<td>• present and discuss their own results with the team and the other members of the course</td>
<td></td>
</tr>
<tr>
<td>Self-competence</td>
<td>The students:</td>
</tr>
<tr>
<td>• learn about their own limitations and learn to accept criticism in order to strengthen their own abilities</td>
<td></td>
</tr>
<tr>
<td>Module contents</td>
<td>This course teaches methods, approaches and techniques in the field of information processing in order to support solutions to problems that arise from companies' impact on the environment. In particular, ICT supported approaches of production-integrated environmental protection, environmental controlling and reporting are introduced and discussed. In order to enable the integration of such approaches into environmental protection, environmental management and its systems are taught as well.</td>
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<tr>
<td>The content in detail:</td>
<td></td>
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<tr>
<td>• environmental management as a basis for sustainability</td>
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<tr>
<td>• sustainability and material flow management</td>
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<td>• strategic environmental management</td>
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<td>• eco-controlling life cycle</td>
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<td>• characteristics and system architectures of CEMIS</td>
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<td>• standard software systems</td>
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• environmental accounting systems

Reader's advisory


Links

http://www.wi-ol.de

Language of instruction

German

Duration (semesters)

1 Semester

Module frequency

jährlich

Module capacity

unlimited

Modulelevel

AS (Akzentsetzung / Accentuation)

Modulart

je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program

V+Ü

Vorkenntnisse / Previous knowledge

Examination Time of examination Type of examination
Final exam of module At the end of the lecture period exercises and written exam (max. 120 min.)

Course type Comment SWS Frequency Workload attendance
Lecture 2.00 28 h
Exercises 2.00 28 h

Total time of attendance for the module

56 h
**inf659 - Environmental Management Information Systems II**

<table>
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<th>Environmental Management Information Systems II</th>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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**Used in course of study**
- Master Informatik > Angewandte Informatik
- Master Sustainability Economics and Management > Ergänzungsmodule
- Master Umweltmodellierung > Mastermodule
- Master Wirtschaftsinformatik > Akzentsetzungsmodule Bereich Wirtschaftsinformatik

**Contact person**
- Module responsibility
  - Jorge Marx Gomez
  - Die im Modul Lehrenden
- Authorized examiners
  - Jorge Marx Gomez
  - Die im Modul Lehrenden

**Entry requirements**

**Skills to be acquired in this module**
This course aims at examining emerging research questions in the field of corporate environmental management information systems (CEMIS). After finishing this course, the students will have extensive knowledge regarding Business Environmental Informatics. In addition, they will be aware of recent research topics and challenges as well as relevant software solutions and practical projects.

**Professional competence**
The students:
- will obtain extensive knowledge in the field of CEMIS
- know emerging research questions and challenges as well as software solutions and projects

**Methodological competence**
The students:
- find their own solutions or apply already existing approaches to new and unsolved questions in the field of CEMIS
- capture required data, analyse it and present it to their team or the whole group

**Social competence**
The students:
- are supposed to work in teams and therefore have to identify working packages and have to take on responsibility for the jobs assigned to them
- present and discuss their own results with the team and the other members of the course

**Self-competence**
The students:
- learn about their own limitations and learn to accept criticism in order to strengthen their own abilities

**Module contents**
A strong social pressure forces enterprises to question their current way of implementing their business and to include different aspects of sustainability into their strategies and operational actions. Such a rethinking of one's business is supported by corporate environmental management information systems. Such systems aim at optimising the energy and resource usage, emission and waste minimisation as well as production integrated environmental protection. Of course they support the fulfillment of legal requirements such as waste management or hazardous material handling.

The module will cover:
- recent and emerging research questions and topics related to the field of CEMIS as well as Business Environmental Informatics.
- discussion and hands-on experience of standard software systems and newly established solutions.
- applying the knowledge obtained to the definition of new as well as on solving new case studies.

Hershey (PA), London

- Rautenstrauch, C. (1999), Betriebliche Umweltnformationssysteme, Springer-Verlag

Links
http://www.wi-ol.de

Languages of instruction
German, English

Duration (semesters)
1 Semester

Module frequency
jährlich

Module capacity
unlimited

Reference text
Type and language of program will be announced prior to the beginning of the course

Modullevel
AS (Akzentsetzung / Accentuation)

Modulart
je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program
V (2 SWS), Ü (2 SWS) or SE announced at the beginning of the lecture period (2SWS V + 2 SWS Ü oder block seminar)

Vorkenntnisse / Previous knowledge

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<td>Usually 2 weeks after the end of the lecture period</td>
<td>Seminar paper and presentation or term paper</td>
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<td>Exercises</td>
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Total time of attendance for the module
56 h
inf980 - Introduction to Computer Science for Natural Science Students

Module label
Introduction to Computer Science for Natural Science Students

Module code
inf980

Credit points
6.0 KP

Workload
180 h

Used in course of study

- Fach-Bachelor Betriebswirtschaftslehre für Leistungssportlerinnen und Leistungssporter > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Business Administration in mittelständischen Unternehmen > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Chemie > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Comparative and European Law > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Engineering Physics > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Wirtschaftsinformatik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
musisch-künstlerischer Fächer

- Zwei-Fächer-Bachelor Ev. Theologie und Religionspädagogik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Gender Studies > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Germanistik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Geschichte > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Kunst und Medien > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Musik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Interdisziplinäre Sachbildung > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Gender Studies > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Informatik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Kunst und Medien > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Materielle Kultur: Textil > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Materielle Kultur: Textil > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Mathematik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Mathematik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Musik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Musik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Niederlandistik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Niederlandistik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Ökonomische Bildung > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Ökonomische Bildung > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Pädagogik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Pädagogik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Philosophie / Werte u. Normen > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Philosophie / Werte u. Normen > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Physik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Physik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Politik-Wirtschaft > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Politik-Wirtschaft > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Slawistik > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Slawistik > Säule "Überfachliche Professionalisierung"
- Zwei-Fächer-Bachelor Sozialwissenschaften > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Zwei-Fächer-Bachelor Sozialwissenschaften > Säule "Überfachliche Professionalisierung"

Contact person
- Ute Vogel-Sonnenschein

Authorized examiners
- Die im Modul Lehrenden

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Languages of instruction
- German, English
### Duration (semesters)
1 Semester

### Module frequency

### Module capacity
unlimited

### Modullevel
---

### Modulart
je nach Studiengang Pflicht oder Wahlpflicht

### Lern-Lehrform / Type of program

### Vorkenntnisse / Previous knowledge

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### Final exam of module

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### Total time of attendance for the module
56 h
mar353 - Grundlagen mathematischer Modellierung

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**Used in course of study**
- Master Marine Umweltwissenschaften > Mastermodule
- Master Umweltmodellierung > Mastermodule

**Contact person**
- Module responsibility
  - Cora Kohlmeier
- Authorized examiners
  - Cora Kohlmeier

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**
- unlimited

**Module capacity**

**Modullevel**
- ---

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Total time of attendance for the module**
- 56 h
mar354 - Advanced mathematical modelling

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<td>Module responsibility</td>
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<td>Authorized examiners</td>
<td>Bernd Blasius</td>
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| Final exam of module         | KL                              |
| Course type                  |                                  |
| Comment                      |                                  |
| SWS                          | Frequency                       |
| Workload attendance          |                                  |
| Lecture                      | 2.00                            | WiSe | 28 h |
| Exercises                    | 2.00                            | WiSe | 28 h |

| Total time of attendance for the module | 56 h |
mar355 - Physikalische Ozeanographie

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</table>

**Contact person**
- Module responsibility
  - Jörg-Olaf Wolff
  - Authorized examiners
  - Jörg-Olaf Wolff
  - Karsten Lettmann
- Module counseling
  - Karsten Lettmann

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**

**Module capacity**
- unlimited

**Modullevel**
- ---

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrtform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Final exam of module**

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<td>Seminar or exercise</td>
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**Total time of attendance for the module**
- 56 h
mar356 - Ozean-Klima-Umweltphysik

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<td>• Oliver Zielinski</td>
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Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Languages of instruction German, English

Duration (semesters) 1 Semester

Module frequency

Module capacity unlimited

Module level ---

Modulart je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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Total time of attendance for the module 56 h
### mar357 - Meeres- und Geochemie

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#### Contact person
- **Module responsibility**
  - Katharina Pahnke
- **Authorized examiners**
  - Hans-Jürgen Brumsack
  - Thorsten Dittmar
  - Katharina Pahnke
  - Heinz Wilkes
- **Module counseling**
  - Hans-Jürgen Brumsack
  - Thorsten Dittmar
  - Heinz Wilkes

#### Entry requirements

#### Skills to be acquired in this module

#### Module contents

#### Reader's advisory

#### Links

#### Language of instruction
- German

#### Duration (semesters)
- 1 Semester

#### Module frequency
- ---

#### Module capacity
- unlimited

#### Modulart
- je nach Studiengang Pflicht oder Wahlpflicht

#### Lern-Lehrform / Type of program

#### Vorkenntnisse / Previous knowledge

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#### Course type
- Lecture

#### SWS
- 4.00

#### Frequency
- WiSe

#### Workload attendance
- 56 h
mar363 - Theorie ökologischer Gemeinschaften

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56 h
mar365 - Stochastische Prozesse

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| Modulart | je nach Studiengang Pflicht oder Wahlpflicht |

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mar367 - Ozeanmodelle

Module label: Ozeanmodelle
Module code: mar367
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Master Marine Sensorik > Mastermodule
- Master Marine Umweltwissenschaften > Mastermodule
- Master Umweltmodellierung > Mastermodule

Contact person

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency

Module capacity: unlimited

Modullevel: ---

Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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mar368 - Klimamodelle

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| Duration (semesters)    | 1 Semester |
| Module frequency        | unlimited |
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mar369 - Kritische Zustände im System Erde: Kipppunkte und Resilienz

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mar374 - Nichtlineare Dynamik im Erdsystem

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• Master Umweltmodellierung > Mastermodule |

Contact person

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Language of instruction       | German |
Duration (semesters)           | 1 Semester |
Module frequency               |         |
Module capacity                | unlimited |
Modullevel                     | ---     |
Modultyp                      | je nach Studiengang Pflicht oder Wahlpflicht |

Lern- / Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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mar375 - Modelle in der Populationsdynamik

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**Contact person**

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**   | German

**Duration (semesters)**  | 1 Semester

**Module frequency**

**Module capacity**   | unlimited

**Modulart**   | je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

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| Contact person     |                         |
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| Skills to be acquired in this module |             |
| Module contents    |                         |
| Reader's advisory  |                         |
| Links              |                         |
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| Duration (semesters) | 1 Semester          |
| Module frequency   |                         |
| Module capacity    | unlimited              |
| Modullevel         | ---                    |
| Modulart           | je nach Studiengang Pflicht oder Wahlpflicht |

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mar432 - Biogeochemie

Module label: Biogeochemie
Module code: mar432
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Master Marine Umweltwissenschaften > Mastermodule
- Master Umweltmodellierung > Mastermodule

Contact person
Entry requirements
Skills to be acquired in this module
Module contents
Reader's advisory
Links
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency
Module capacity: unlimited
Modulelevel: ---
Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination | Time of examination | Type of examination
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Final exam of module | KL

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Total time of attendance for the module 56 h
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mar459 - Macrobenthos communities

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Contact person

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Language of instruction

German

Duration (semesters)

1 Semester

Module frequency

Module capacity

unlimited

Modulart

je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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Total time of attendance for the module

56 h
mar461 - Functional marine biodiversity

Module label: Functional marine biodiversity
Module code: mar461
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Master Marine Umweltwissenschaften > Mastermodule
- Master Umweltmodellierung > Mastermodule

Contact person

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Language of instruction: German
Duration (semesters): 1 Semester

Module frequency
Module capacity: unlimited
Modullevel: ---
Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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Total time of attendance for the module: 56 h
### mar470 - Programmierkurs Meereswissenschaften

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                          | • Master Umweltmodellierung > Mastermodule |

**Contact person**

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction** German

**Duration (semesters)** 1 Semester

**Module frequency**

**Module capacity** unlimited

**Modullevel** ---

**Modulart** je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Workload attendance** 56 h
mar671 - Statistik-Software R: Einführung

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| Vorkenntnisse / Previous knowledge |                                  |

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**Used in course of study**
- Master Umweltmodellierung > Mastermodule

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**

**Module capacity**
- unlimited

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

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**Total time of attendance for the module**
- 56 h
mar700 - Introduction to Environmental Modelling

Module label: Introduction to Environmental Modelling
Module code: mar700
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Master Umweltmodellierung > Mastermodule

Contact person:
Module responsibility
- Ulrike Feudel
Authorized examiners
- Alle hier genannten
Module counseling
- Lehrende Umweltmodellierung

Entry requirements:

Skills to be acquired in this module:

Module contents:

Reader's advisory:

Links:

Language of instruction: German
Duration (semesters): 1 Semester

Module frequency:
Module capacity: unlimited
Module level: ---
Module type: je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination Type of examination
Final exam of module HA

Course type Comment SWS Frequency Workload attendance
Lecture 2.00 WiSe 28 h
Exercises 2.00 WiSe 28 h

Total time of attendance for the module: 56 h
### mar710 - Fundamental Competences

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**Contact person**

- Module responsibility
  - Bernd Blasius
  - Alle hier genannten

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

- Languages of instruction: German, English

**Duration (semesters)**

1 Semester

**Module frequency**

unlimited

**Module level**

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**Modulart**

je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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mar715 - Grundlagen Biologie/Ökologie

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**Used in course of study**
- Master Umweltmodellierung > Mastermodule

**Contact person**

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**

**Module capacity**
- unlimited

**Modullevel**
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**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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- Lecture

**SWS**
- 4.00

**Frequency**
- SuSe or WiSe

**Workload attendance**
- 56 h
mar716 - Geochemie

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**mar718 - Hydrodynamik**

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mar719 - Mathematische Modellierung

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| 56 h |


mar720 - Environmental Systems and Biodiversity

Module label
Environmental Systems and Biodiversity

Module code
mar720

Credit points
12.0 KP

Workload
360 h

Used in course of study
- Master Umweltmodellierung > Mastermodule

Contact person
Module responsibility
- Michael Kleyer
Authorized examiners
- Alle hier genannten
Module counseling
- Gerhard Wolfgang Zotz
- Luise Dorothee Giani
- Gudrun Massmann
- Bernd Blasius
- Jörg-Olaf Wolff
- Ulrike Feudel
- Karsten Leitmann
- Thorsten Henning Brinkhoff
- Maaike Bader
- Ellen Kiel
- Helmut Hillebrand
- Dirk Carl Albach
- Janek Greskowiak
- Barbara Scholz-Böttcher
- Hans-Jürgen Brumsack

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links
Languages of instruction
German, English

Duration (semesters)
2 Semester

Module frequency

Module capacity
unlimited

Moduleart
je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination

Final exam of module
M

Course type
Course selection

SWS
4.00

Frequency
WiSe

Workload attendance
56 h
### mar722 - Ökologie von Pflanzen und Tieren

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mar723 - Biodiversität der Pflanzen

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Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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Final exam of module

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Total time of attendance for the module | 56 h |
mar730 - Energy Systems

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**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Languages of instruction**

- German, English

**Duration (semesters)**

- 2 Semester

**Module frequency**

- unlimited

**Module level**

- ---

**Modulart**

- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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mar733 - Wind Resource and its Application

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mar734 - Solar Resource and its Application

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**Used in course of study**
- Master Umweltmodellierung > Mastermodule

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**

**Module capacity**
- unlimited

**Module level**
- ---

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Contact person**

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction** | German  |
|------------------------------|---------|

**Duration (semesters)** | 1 Semester |

**Module frequency**

**Module capacity** | unlimited |

**Modulart** | je nach Studiengang Pflicht oder Wahlpflicht |

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Course type** | Lecture |

**SWS** | 4.00 |

**Frequency** | SuSe or WiSe |

**Workload attendance** | 56 h |

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**Contact person**
- Module responsibility
  - Heinz Welsch
- Authorized examiners
  - Alle hier genannten
- Module counseling
  - Christoph Böhringer
  - Carsten Helm
  - Klaus Eisenack

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Languages of instruction**
- German, English

**Duration (semesters)**
- 2 Semester

**Module frequency**
- ---

**Module capacity**
- unlimited

**Modullevel**
- ---

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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mar742 - Umwelt- und Ressourcen- Ökonomie

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mar743 - Energie- und Klimawandel-Ökonomie

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mar750 - Process and System-oriented Environmental Modelling

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**mar754 - Modellierung komplexer Systeme**

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**Used in course of study**
- Master Umweltmodellierung > Mastermodule

**Contact person**

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**

**Module capacity**
- unlimited

**Modullevel**
- ---

**Modulant**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Course type**
- Seminar

**SWS**
- 4.00

**Frequency**
- SuSe or WiSe

**Workload attendance**
- 56 h
mar755 - Fluiddynamik

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mar756 - Hydrogeologische Modellierung

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**mar760 - Statistical Environmental Modelling**

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**Contact person**
- Module responsibility
  - Jan Freund
- Authorized examiners
  - Alle hier genannten
- Module counseling
  - Cord Peppler-Lisbach
  - Robert Biedermann
  - Vanessa Minden
  - Ralf Werner Stecking

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Languages of instruction**
- German, English

**Duration (semesters)**
- 2 Semester

**Module frequency**
- unlimited

**Module capacity**
- ---

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**
- Time of examination
- Type of examination

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**Total time of attendance for the module**
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mar768 - Statistische Analyse

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| Total time of attendance for the module | 56 h |
mar770 - Modelling of Large Systems

Module label: Modelling of Large Systems
Module code: mar770
Credit points: 18.0 KP
Workload: 540 h
Used in course of study: Master Umweltmodellierung > Mastermodule

Contact person:
- Module responsibility
- Michael Sonnenschein
- Authorized examiners
- Alle hier genannten
Module counseling
- Ute Vogel-Sonnenschein
- Angelika May
- Alexander Hartmann
- Christoph Böhringer
- Jorge Marx Gomez
- Andreas Winter

Entry requirements

Skills to be acquired in this module

Module contents

Reader’s advisory

Links

Languages of instruction: German, English
Duration (semesters): 2 Semester

Module frequency

Module capacity: unlimited
Module level: ---

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination Time of examination Type of examination

Final exam of module

Course type Comment SWS Frequency Workload attendance
Lecture 0.00 WiSe 0 h
Seminar 2.00 WiSe 28 h
Exercises 2.00 WiSe 28 h

Total time of attendance for the module: 56 h
### mar779 - Computerorientierte Physik

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#### Language of instruction
- **German**

#### Duration (semesters)
- 1 Semester

#### Module frequency
- ---

#### Module capacity
- unlimited

#### Moduleart
- je nach Studiengang Pflicht oder Wahlpflicht

#### Lern-/Lehrform / Type of program

#### Vorkenntnisse / Previous knowledge

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#### Course type
- Vorlesung und Übung

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## mar780 - Practical Seminar Modelling Study

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### Entry requirements

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Languages of instruction**

**Duration (semesters)**

**Module frequency**

**Module capacity**

**Module level**

**Moduleart**

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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**Course type**

**Course selection**

**SWS**

**Frequency**

**Workload attendance**

**WiSe**

**56 h**
mar790 - Supplementary Modules

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- **Used in course of study**: Master Umweltmodellierung > Mastermodule

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Languages of instruction**

- **Duration (semesters)**: 1 Semester

**Module frequency**

- **Module capacity**: unlimited

**Modulart**

- je nach Studiengang Pflicht oder Wahlpflicht

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**Vorkenntnisse / Previous knowledge**

**Final exam of module**

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| Lecture | 2.00 | WiSe | 28 h |
| Seminar | 0 h  |      |      |
| Exercises | 2.00 | WiSe | 28 h |

- **Total time of attendance for the module**: 56 h
mar800 - Research Project

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Entry requirements
Skills to be acquired in this module
Module contents
Reader's advisory
Links
Languages of instruction | German, English |
Duration (semesters) | 1 Semester |
Module frequency
Module capacity | unlimited |
Module level | --- |
Modulart | je nach Studiengang Pflicht oder Wahlpflicht |
Lern-Lehrform / Type of program

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Course type
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Total time of attendance for the module | 84 h |
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**Used in course of study**

- Fach-Bachelor Betriebswirtschaftslehre für Leistungssportlerinnen und Leistungsportler > Fachnahe Angebote Biologie
- Fach-Bachelor Betriebswirtschaftslehre für Leistungssportlerinnen und Leistungsportler > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Betriebswirtschaftslehre mit juristischem Schwerpunkt > Fachnahe Angebote Biologie
- Fach-Bachelor Betriebswirtschaftslehre mit juristischem Schwerpunkt > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Biologie > Fachnahe Angebote Biologie more...
- Fach-Bachelor Biologie > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Business Administration in mittelständischen Unternehmen > Fachnahe Angebote Biologie
- Fach-Bachelor Business Administration in mittelständischen Unternehmen > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Chemie > Fachnahe Angebote Biologie
- Fach-Bachelor Chemie > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Comparative and European Law > Fachnahe Angebote Biologie
- Fach-Bachelor Comparative and European Law > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Engineering Physics > Fachnahe Angebote Biologie
- Fach-Bachelor Engineering Physics > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Informatik > Fachnahe Angebote Biologie
- Fach-Bachelor Informatik > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Interkulturelle Bildung und Beratung > Fachnahe Angebote Biologie
- Fach-Bachelor Interkulturelle Bildung und Beratung > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Mathematik > Fachnahe Angebote Biologie
- Fach-Bachelor Mathematik > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Nachhaltigkeitsökonomik > Fachnahe Angebote Biologie
- Fach-Bachelor Nachhaltigkeitsökonomik > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Pädagogik > Fachnahe Angebote Biologie
- Fach-Bachelor Pädagogik > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft > Fachnahe Angebote Biologie
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Physik > Fachnahe Angebote Biologie
- Fach-Bachelor Physik > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Physik, Technik und Medizin > Fachnahe Angebote Biologie
- Fach-Bachelor Physik, Technik und Medizin > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Sozialwissenschaften > Fachnahe Angebote Biologie
- Fach-Bachelor Sozialwissenschaften > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Umweltwissenschaften > Fachnahe Angebote Biologie
- Fach-Bachelor Umweltwissenschaften > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Wirtschaftsinformatik > Fachnahe Angebote Biologie
- Fach-Bachelor Wirtschaftsinformatik > Fachnahe Angebote Umweltwissenschaften
- Fach-Bachelor Wirtschaftswissenschaften > Fachnahe Angebote Biologie
- Fach-Bachelor Wirtschaftswissenschaften > Fachnahe Angebote Umweltwissenschaften
- Master Umweltmodellierung > Mastermodule
- Zwei-Fächer-Bachelor Anglistik > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Anglistik > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Biologie > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Biologie > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Chemie > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Chemie > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Elementarmathematik > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Elementarmathematik > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Ev. Theologie und Religionspädagogik > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Ev. Theologie und Religionspädagogik > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Gender Studies > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Gender Studies > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Germanistik > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Germanistik > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Geschichte > Fachnahe Angebote Biologie
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- Zwei-Fächer-Bachelor Informatik > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Informatik > Fachnahe Angebote Umweltwissenschaften
- Zwei-Fächer-Bachelor Interdisziplinäre Sachbildung > Fachnahe Angebote Biologie
- Zwei-Fächer-Bachelor Interdisziplinäre Sachbildung > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Kunst und Medien > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Kunst und Medien > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Materielle Kultur: Textil > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Materielle Kultur: Textil > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Mathematik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Mathematik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Musik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Musik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Niederlandistik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Niederlandistik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Ökonomische Bildung > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Ökonomische Bildung > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Pädagogik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Pädagogik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Philosophie / Werte u. Normen > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Philosophie / Werte u. Normen > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Physik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Physik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Politik-Wirtschaft > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Politik-Wirtschaft > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Slavistik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Slavistik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Sonderpädagogik > Fachnahe Angebote Biologie
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Zwei-Fächer-Bachelor Sozialwissenschaften > Fachnahe Angebote Umweltwissenschaften
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Zwei-Fächer-Bachelor Technik > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Technik > Fachnahe Angebote Umweltwissenschaften
Zwei-Fächer-Bachelor Wirtschaftswissenschaften > Fachnahe Angebote Biologie
Zwei-Fächer-Bachelor Wirtschaftswissenschaften > Fachnahe Angebote Umweltwissenschaften

Contact person

Module responsibility
- Jan Freund

Authorized examiners
- Alle hier genannten

Module counseling
- Cord Peppler-Lisbach
- Gerhard Wolfgang Zotz
- Helmut Hillebrand
- Michael Winkhofer

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Language of instruction
- German

Duration (semesters)
- 1 Semester

Module frequency

Module capacity
- 45

Modulelevel
- ---

Modulart
- je nach Studiengang Pflicht oder Wahlpflicht

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

Time of examination

Type of examination

Final exam of module

KL

Course type

Comment

SWS

Frequency

Workload attendance

Lecture

2.00

28 h

Exercises

2.00

28 h

Total time of attendance for the module

56 h
mat837 - Extreme Value Statistics and Applications

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Contact person

Module responsibility

- Marcus Christiansen
- Angelika May
- Peter Ruckdeschel

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Languages of instruction

German, English

Duration (semesters)

1 Semester

Module frequency

Module capacity

unlimited

Moduleart

je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

Time of examination

Type of examination

Final exam of module

Comment

KL

Course type

SWS

Frequency

Workload attendance

Lecture

3.00

--

42 h

Exercises

1.00

--

14 h

Total time of attendance for the module

56 h
mat839 - Time Series Models resp. State Space Models

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<td>Marcus Christiansen</td>
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<td>Angelika May</td>
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<td>Peter Ruckdeschel</td>
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mat843 - Elements of Multivariate Statistics

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**Used in course of study**
- Master Mathematik > Mastermodule
- Master Umweltmodellierung > Mastermodule

**Contact person**
- Module responsibility
  - Angelika May
  - Marcus Christiansen
  - Peter Ruckdeschel

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Languages of instruction**
- German, English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- ---

**Module capacity**
- unlimited

**Modulart**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
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<tr>
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**Course type**

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<td>Exercises</td>
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**Total time of attendance for the module**
- 56 h
### mat847 - Elements of Exploratory Data Analysis, Robust Statistics, and Diagnostics

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| Used in course of study | • Master Mathematik > Mastermodule  
• Master Umweltmodellierung > Mastermodule |
| Contact person | Module responsibility  
• Marcus Christiansen  
• Angelika May  
• Peter Ruckdeschel |

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Languages of instruction** | German, English |
<table>
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**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Final exam of module**

<table>
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**Total time of attendance for the module**

56 h
### mat849 - Statistical Algorithms

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| Used in course of study | • Master Mathematik > Mastermodule  
                      | • Master Umweltmodellierung > Mastermodule                |
| Contact person        | Module responsibility                                       |
|                       | • Marcus Christiansen                                       |
|                       | • Angelika May                                              |
|                       | • Peter Ruckdeschel                                         |
| Entry requirements    |                                                             |
| Skills to be acquired in this module |                                                 |
| Module contents       |                                                             |
| Reader’s advisory     |                                                             |
| Languages of instruction | German, English                                         |
| Duration (semesters)  | 1 Semester                                                  |
| Module frequency      |                                                             |
| Module capacity       | unlimited                                                   |
| Module level          | ---                                                         |
| Modulart              | je nach Studiengang Pflicht oder Wahlpflicht                |
| Lern-/Lehrform / Type of program |                                           |
| Examination           | Time of examination                                         |
| Final exam of module  | Type of examination                                         |

**Course type** | **Comment** | **SWS** | **Frequency** | **Workload attendance**
--- | --- | --- | --- | ---
Lecture | | 3.00 | -- | 42 h
Exercises | | 1.00 | -- | 14 h

**Total time of attendance for the module** 56 h
wir808 - Multivariate Statistics

Module label: Multivariate Statistics
Module code: wir808
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Master Sustainability Economics and Management > Ergänzungsmodule
- Master Wirtschaftsinformatik > Module der Wirtschafts- und Rechtswissenschaften (Master)
- Master Wirtschafts- und Rechtswissenschaften > Mantelmodule
- Master Wirtschafts- und Rechtswissenschaften > Schwerpunkt "Volkswirtschaftslehre" (VWL)

Contact person:
Module responsibility: Ralf Werner Stecking
Authorized examiners: Die im Modul Lehrenden

Entry requirements:

Skills to be acquired in this module:

With successful completion of the course, students shall:

- be aware of and be able to evaluate advanced methods of multivariate data analysis.
- be able to select adequate methods in relevant fields of application, like prediction, classification, and segmentation analysis.
- be able to run computer-aided analyses and to interpret the results properly.

Module contents:

Various methods of quantitative data analysis such as:

- Linear Regression.
- Logistic Regression.
- Linear Discriminant Analysis.
- Principal Component Analysis.
- Feature selection and evaluation methods.

Reader's advisory:

Links:

Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Module level: MM-PB (Professionalisierungsbereichsmodul im Master)
Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination: Final exam of module
Time of examination: at the end of the semester
Type of examination: written exam or oral exam

Course type: Comment  SWS  Frequency  Workload attendance
Lecture: 2.00  28 h
Exercises: 2.00  28 h

Total time of attendance for the module: 56 h
Abschlussmodul

**mam - Master`s Thesis Module**

<table>
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<td>Ulrike Feudel</td>
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