Modulhandbuch

Applied Economics and Data Science - Master-Studiengang

im Winter semester 2023/2024

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Economics

wir821 - International Trade, Production and Change

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<tr>
<th>Module label</th>
<th>International Trade, Production and Change</th>
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<tbody>
<tr>
<td>Module abbreviation</td>
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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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### Applicability of the module
- kein Abschluss European Studies in Global Perspectives > Society, Economy and Politics
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration: Management and Law (Master) > Kernmodule CHI
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

### Responsible persons
- Trautwein, Hans-Michael (module responsibility)
- Trautwein, Hans-Michael (authorised to take exams)
- Bitzer, Jürgen (authorised to take exams)
- Poppitz, Philipp (authorised to take exams)
- Trautwein, Hans-Michael (Module counselling)

### Prerequisites
- keine

### Skills to be acquired in this module
- Understanding of trade relations, international factor movements and corresponding balance-of-payments mechanisms.
- Capability to discuss structural change in global trade and productions in terms of formal models and case studies.
- Understanding of the causes and alternative strategies of economic integration in regional blocs.
- Understanding of the causes and alternative strategies of economic transformation in emerging markets.
- Ability to research data and evaluate the literature on specific aspects of international trade, production and structural change.

### Module contents
The lectures and seminar papers address issues in the following subfields:

- international trade,
- international trade policies and regimes,
- geographical economics,
- foreign direct investment,
- labour migration,
- fragmentation of production,
- regulations of international trade and factor movements,
- development strategies,
- regional integration.

### Recommended reading


Further references to specific topics and current literature will be given in the events.

### Links
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Reference text
  - Das Seminar wird in der Form eines Blockseminars abgehalten.
Es gibt eine Vorbesprechung Anfang des Semesters, in der die Themen vergeben werden.

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<td>Type of examination</td>
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<td>seminar paper and presentation</td>
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<th>Workload of compulsory attendance</th>
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| Total module attendance time | 56 h   |
**Module label** | International Finance and Exchange Rate Economics  
| |  
| **Module abbreviation** | wir823  
| **Credit points** | 6.0 KP  
| **Workload** | 180 h  

**Applicability of the module**
- kein Abschluss European Studies in Global Perspectives > Society, Economy and Politics
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration: Management and Law (Master) > Basismodule
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule AFT - VWL

**Responsible persons**
- Trautwein, Hans-Michael (module responsibility)
- Trautwein, Hans-Michael (authorised to take exams)
- Trautwein, Hans-Michael (Module counselling)

**Skills to be acquired in this module**
- Understanding of exchange rates as strategic prices in open economies.
- Understanding of the interdependence of balance-of-payments constraints and exchange rates.
- Capability to discuss different models of exchange rate determination.
- Ability to research data and evaluate the literature on specific aspects of financial market globalization and strategies of exchange-rate policy.
- Understanding of the history of fixed-exchange-rate systems.
- Ability to relate the importance of historical experience in international monetary and financial economics.

**Module contents**
The lectures address the following issues:
- exchange rates and the balance of payments,
- open-economy macroeconomics,
- exchange rate determination,
- international financial markets,
- fixed-exchange-rate systems,
- currency crises,
- optimum currency areas and monetary integration,
- choice of exchange rate regime,
- financial market regulation.

In the seminar students will present papers on general and topical issues (theoretical models, policy strategies, case studies) in the fields of financial market globalization and exchange-rate policy.

**Recommended reading**
Selected chapters from:

And other specific readings for the seminar papers.

**Links**

**Language of instruction** | English  
| **Duration (semesters)** | 1 Semester  
| **Module frequency** | jährlich  
| **Module capacity** | unlimited  

**Reference text**
- Mitarbeit in Vorlesung und Seminar ist Pflicht für den Erwerb eines Leistungsnachweises.
- Das Seminar wird in der Form eines Blockseminars abgehalten.
- Es gibt eine Vorbesprechung Anfang des Semesters, in der die Themen vergeben werden.
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<th>Previous knowledge</th>
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**wir873 - Applied Economics**

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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Economics
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

**Responsible persons**
- Bitzer, Jürgen (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Skills to be acquired in this module**
The students are able to:
- develop an empirical research project,
- collect the required data,
- carry out an econometric analysis,
- interpret, discuss and present the results.

**Module contents**
The module consists of a lecture and a seminar. In the lecture, the students develop their research project and present their work process. In the bloc seminar, the students present their results and discuss them.

**Recommended reading**

**Links**

**Languages of instruction**
- German, English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

**Reference text**

**Module level**

**Type of module**

**Teaching/Learning method**

**Previous knowledge**

**Examination**

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**Final exam of module**

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<td>Seminar</td>
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**Total module attendance time**
- 56 h
wir874 - Advanced Microeconomics

Module label: Advanced Microeconomics
Module abbreviation: wir874
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration. Management and Law (Master) > Basismodule
- Master's programme Business Administration: Management and Law (Master) > Kernmodule CHI
- Master's programme Social Sciences (Master) > Wahlpflichtmodule anderer Institute und Departments

Responsible persons:
- Helm, Carsten (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Lehrenden, Die im Modul (Module counselling)

Prerequisites:
keine

Skills to be acquired in this module:
- Students understand the importance of incentive systems for economic processes and can analyze the effects of incentive systems;
- have a firm knowledge in game theory and contract theory, and can address questions in the context of scientific discussion;
- are able to apply methods from game theory and contract theory largely independently to the analysis of situations in which agents interact strategically;
- are able to design incentive schemes – on their own and in teams – and to acquire knowledge on their own for this purpose and, to present their results, and to defend them in the scientific discourse.

Module contents:
The first part of the module covers game theory. Game theory is an important method in economics to analyze strategic interactions of agents, e.g., on markets, in organizations or in bargaining situations.
The second part of the module covers contract theory that – according to the Nobel laureate Kenneth Arrow – has been „the most important development in economics in the last forty years“. We work out the fundamentals of screenings, signaling and moral hazard and apply them to different topics, e.g., from labor economics, economic organization and management, law and economics as well as industrial economics.
In both parts, there is a tutorial. Here students largely independently apply the acquired knowledge to different situations of strategic interaction in economics and present their results.

Recommended reading:

Links:
http://www.fiwi.uni-oldenburg.de/

Language of instruction:
English

Duration (semesters):
1 Semester

Module frequency:
jährlich

Module capacity:
unlimited

Module level:

Type of module:
Teaching/Learning method:

Previous knowledge:

Examination:
Examination times:
Type of examination:

Final exam of module:
At the end of the lecture period.
exam

Workload:

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Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Module level:
Type of module:
Teaching/Learning method:
Previous knowledge:
Examination:
Examination times:
Type of examination:
Final exam of module:
At the end of the lecture period.
exam
Workload:
- Type of course | Comment | SWS | Frequency | Workload of compulsory attendance |
- Course or seminar | 4 | WISe | 56 |
- Exercises | -- | 0 |
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### wir876 - Topics in Economic Research

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#### Applicability of the module
- Master Applied Economics and Data Science (Master) > Economics
- Master's Programme Water and Coastal Management (Master) > Socioeconomics

#### Responsible persons
- Bitzer, Jürgen (module responsibility)
- Böhringer, Christoph (module responsibility)
- Helm, Carsten (module responsibility)
- Trautwein, Hans-Michael (module responsibility)
- Huse, Cristian (module responsibility)
- Gören, Erkan (module responsibility)
- Asane-Otoo, Emmanuel (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Lehrenden, Die im Modul (Module counselling)

#### Skills to be acquired in this module
Students have the opportunity to take an economics module of their choice (worth 6 CP) at the master’s level. This can also take place at another university or during studies abroad.

Students are required to:
- independently engage with a topic using scientific methods,
- independently research and make use of current academic literature,
- integrate their topic into an academic discussion.

#### Module contents
This is dependent upon the module chosen.

#### Recommended reading

#### Links

#### Languages of instruction

#### Duration (semesters)
1 Semester

#### Module frequency
ahalbjährlich

#### Module capacity
unlimited

#### Module level

#### Type of module

#### Teaching/Learning method

#### Previous knowledge

#### Examination

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#### Type of course

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#### Total module attendance time
56 h
The course covers key concepts of public economics, which studies how government taxing and spending activities affect the economy – economic efficiency and the distribution of income and wealth.

Lecture: After introducing the theory and methodology of public economics, we discuss a historical and theoretical overview of the public sector. We then focus on departures from efficiency (especially asymmetric information), taxation issues (including tax evasion, fiscal federalism and tax competition among independent jurisdictions), and the intertemporal issue of social security (especially pension system). Seminar: covers current issues in public economics, e.g. reform of health care or pension system.

Recommended reading

<table>
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<th>Examination times</th>
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**Total module attendance time**: 56 h
wir901 - Environmental Economics

Module label: Environmental Economics
Module abbreviation: wir901
Credit points: 6.0 KP
Workload: 180 h
  - Lecture: 3 SWS (42h)
  - Exercise: 1 SWS (14h)

Applicability of the module
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule NM-VWL
- Master's Programme Computing Science (Master) > Module aus anderen Studiengängen
- Master's Programme Environmental Modelling (Master) > Mastermodule
- Master's Programme Sustainability Economics and Management (Master) > Basic and Accentuation Modules

Responsible persons
- Helm, Carsten (Module counselling)
- Lehrenden, Die im Modul (Module counselling)
- Lehrenden, Die im Modul (authorised to take exams)
- Helm, Carsten (module responsibility)

Prerequisites: Keine
Skills to be acquired in this module
Know and be able to apply fundamental concepts and figures of thought in environmental economics; be able to analyse and evaluate environmental problems and solution approaches; practice scientific methods and the ability to discuss; be able to classify environmental economics in the context of interdisciplinary sustainability research.

Module contents
Economic analysis of environmental impacts (property rights, external effects, market failure); ethical aspects of environmental economics, instruments of environmental policy (tradable permits, taxes, subsidies, liability law); innovation and adaptation of new technologies; international environmental problems.

Recommended reading

Links
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Annually
Module capacity: unlimited
Module level: Type of module: Pflicht o. Wahlpflicht / compulsory or optional
Teaching/Learning method: Lecture and exercise

Previous knowledge

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<th>Type of examination</th>
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<td>Written exam; bonus through solution of exercises</td>
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Total module attendance time: 56 h
**wir889 - Applied Environmental Economics**

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<td>Master's Programme Sustainability Economics and Management (Master) &gt; Akzentmodule</td>
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<td>Responsible persons</td>
<td>Lehrenden, Die im Modul (authorised to take exams)</td>
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<td>Huse, Cristian (module responsibility)</td>
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<td>Prerequisites</td>
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<td>Skills to be acquired in this module</td>
<td>Be able to conceptually understand and apply key empirical tools used by any economist (and other professionals) in Environmental, Energy, and Transport Economics.</td>
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<td>Be able to perform and critically evaluate an empirical analysis.</td>
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<td>Module contents</td>
<td>Econometric methods (discrete choice); Welfare analysis; Valuation; Types of data; Cost-benefit analysis.</td>
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<tr>
<td>On-site workload</td>
<td>56 h</td>
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# wir890 - Climate Economics

<table>
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<tr>
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<tr>
<td>Credit points</td>
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<tr>
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</table>

**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Economics
- Master’s Programme Environmental Modelling (Master) > Mastermodule
- Master’s Programme Sustainability Economics and Management (Master) > Additional Modules

**Responsible persons**
- Böhringer, Christoph (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Riesenbeck, Lukas (Module counselling)

**Prerequisites**
- Microeconomics

**Skills to be acquired in this module**
This course aims at giving students an understanding of reasons, objectives and economic instruments for climate policy. Students first get acquainted with the natural science of the climate where anthropogenic greenhouse gas emissions constitute the source of man-made climate change. The latter is then explained from an economic perspective as a global environmental externality calling for environmental regulation to avoid substantial market failures. Game theoretic analysis of international negotiations and agreements provides key insights about the fundamental problems of free-riding and efficient climate policy design. Beyond theoretical propositions, the lecture will critically discuss past and contemporary climate policies such as the Kyoto Protocol, the Paris Agreement, or the EU Emissions Trading System.

**Module contents**
- Natural science of climate change; environmental externalities and market failures; environmental regulation (emission taxes, standards, tradable permits, etc.); international environmental agreements; critical appraisal of climate policy implementation.

**Recommended reading**

**Language of instruction**
- English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- Annual

**Module capacity**
- 30

**Module level**

**Type of module**

**Teaching/Learning method**

**Previous knowledge**
- Microeconomics

<table>
<thead>
<tr>
<th>Examination</th>
<th>Examination times</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
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<td>At the end of the lecture period</td>
<td>Written exam (max. 120min)</td>
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<td>Seminar</td>
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**Total module attendance time**
- 56 h
wir893 - Development Economics

Module label: Development Economics
Module abbreviation: wir893
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module
- Master Applied Economics and Data Science (Master) > Economics
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

Responsible persons
- Bitzer, Jürgen (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Bitzer, Jürgen (Module counselling)

Prerequisites

Skills to be acquired in this module

The students are able:

- to identify and discuss empirical challenges in research on developing countries
- to understand, summarize, and discuss recent research studies in development economics
- evaluate strategies to reach sustainable economic development discussed in the public and politics
- participate in a discussion on the topic, developing a well-grounded position and problem solving strategy
- to present current research to and discuss it verbally and in written form
- to identify gaps in the literature on developing countries

Module contents
The module introduces the students to the current challenges of developing countries and the strategies to overcome them. The module will focus on the empirical research on developing countries, addressing the reasons for the sluggish development as well as the applied approaches to foster economic development. In the lecture the empirical methods used in development economics will be discussed. In the seminar current research papers on topics like poverty, conflicts, foreign aid, health, human capital and institutions in developing countries will be discussed.

Recommended reading

Links

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Yearly
Module capacity: unlimited

Module level
Type of module
Teaching/Learning method

Previous knowledge

Examination
Examination times
Type of examination
Final exam of module
At the end of the lecture period
Formal presentation with written elaboration and discussion

Type of course
Comment
SWS
Frequency
Workload of compulsory attendance
Lecture
2
SoSe oder WiSe
28
Seminar
2
SoSe oder WiSe
28
Total module attendance time
56 h
WIR895 - Industrial Organization

Module label: Industrial Organization
Module abbreviation: WIR895
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration: Management and Law (Master) > Basismodule
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule UF - VWL
- Master's Programme Sustainability Economics and Management (Master) > Akzentmodule

Responsible persons:
- Huse, Cristian (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Huse, Cristian (Module counselling)

Prerequisites:

Skills to be acquired in this module:
Be able to conceptually understand, critically evaluate, and apply methods used economists to study the behaviour of firms, consumers, and their interaction.

Module contents:
Econometric methods; models of firm behaviour; models of consumer behaviour; regulation; applications.

Recommended reading:

Links:
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: 30
- Module level: 30
- Type of module:
- Teaching/Learning method:
- Previous knowledge:
- Examination:
  - Examination times:
  - Type of examination:
- Final exam of module:
  - At the end of the lecture period
  - Portfolio
- Type of course:
  - Vorlesung und Übung
- SWS: 4
- Frequency: SoSe oder WiSe
- On-site workload: 56 h
**wir922 - Topics in Industrial Organization**

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<td>Workload</td>
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<td>Applicability of the module</td>
<td>Master Applied Economics and Data Science (Master) &gt; Economics</td>
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</tbody>
</table>
| Responsible persons   | Asane-Otoo, Emmanuel (module responsibility)  
                        | Bitzer, Jürgen (module responsibility)  
                        | Böhringer, Christoph (module responsibility)  
                        | Gören, Erkan (module responsibility)  
                        | Helm, Carsten (module responsibility)  
                        | Huse, Cristian (module responsibility)  
                        | Trautwein, Hans-Michael (module responsibility)  
                        | Lehrenden, Die im Modul (authorised to take exams) |
| Prerequisites         | Students have the opportunity to take an economics module of their choice  
                        | (worth 6 CP) at the master's level. This can also take place at another  
                        | university or during studies abroad. Students are required to:  
                        |  
                        | - independently engage with a topic using scientific methods  
                        | - independently research and make use of current academic literature  
                        | - integrate their topic into an academic discussion |
| Module contents       | This is dependent upon the module chosen. |
| Recommended reading   | Links |
| Language of instruction | English |
| Duration (semesters)  | 1 Semester |
| Module frequency      | bi-annualy |
| Module capacity       | unlimited |
| Type of module        | Wahlpflicht / Elective |
| Teaching/Learning method | |
| Previous knowledge    | |

**Examination**  
**Examination times**  
**Type of examination**

| Final exam of module | 1 seminar paper or<br />  
|                      | 1 formal presentation or<br />  
|                      | 1 written examination or<br />  
|                      | 1 oral examination or<br />  
|                      | 1 portfolio or<br />  
|                      | 1 project report |

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<th>Frequency</th>
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<td>Seminar</td>
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<td>SoSe oder WiSe</td>
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**Total module attendance time**  
56 h
### wir751 - Study Abroad I

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#### Applicability of the module
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration: Management and Law (Master) > Ergänzungsmodul - Auslandsstudium

#### Responsible persons
- Lehrenden, Die im Modul (authorised to take exams)
- Bitzer, Jürgen (module responsibility)
- Bitzer, Jürgen (Module counselling)

#### Prerequisites
According to the specification of the foreign university

#### Skills to be acquired in this module
According to the specification of the foreign university

#### Module contents
According to the specification of the foreign university

#### Recommended reading
According to the specification of the foreign university

#### Links
According to the specification of the foreign university

#### Languages of instruction

#### Duration (semesters)
1 Semester

#### Module frequency

#### Module capacity
unlimited [According to the specification of the foreign university]

#### Module level

#### Type of module

#### Teaching/Learning method

#### Previous knowledge

#### Examination
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<th>Type of examination</th>
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#### Final exam of module
| According to the specification of the foreign university | According to the specification of the foreign university |

#### Type of course
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<td>Tutorial</td>
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#### Total module attendance time
0 h
**wir752 - Study Abroad II**

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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Economics
- Master's programme Business Administration: Management and Law (Master) > Ergänzungsmodule - Auslandsstudium

**Responsible persons**
- Bitzer, Jürgen (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Bitzer, Jürgen (Module counselling)

**Prerequisites**
According to the specification of the foreign university

**Skills to be acquired in this module**
According to the specification of the foreign university

**Module contents**
According to the specification of the foreign university

**Recommended reading**
According to the specification of the foreign university

**Links**
According to the specification of the foreign university

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**
unlimited

**Module level**

**Type of module**

**Teaching/Learning method**

**Previous knowledge**

**Examination**

**Examination times**

**Type of examination**

**Final exam of module**
According to the specification of the foreign university

According to the specification of the foreign university

**Type of course**

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**Total module attendance time**
0 h
### wir753 - Study Abroad III

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<th><strong>Frequency</strong></th>
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wir760 - Computable General Equilibrium Analysis

Module label: Computable General Equilibrium Analysis
Module abbreviation: wir760
Credit points: 6.0 KP
Workload: 180 h
Applicability of the module:
- Master Applied Economics and Data Science (Master) > Economics
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

Responsible persons:
- Böhringer, Christoph (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Böhringer, Christoph (Module counselling)

Prerequisites: None

Skills to be acquired in this module:
During the course work students will learn how to set up computable general equilibrium (CGE) models step-by-step using the GAMS software (General Algebraic Modeling System) and apply them to actual policy issues of broader interest.

Module contents:
This course provides a practical guideline to CGE modeling. We start with the formulation of a simple stylized CGE model for open economies and lay out how such a model can be matched (calibrated) to empirical data. We will then discuss several refinements of our prototype model to investigate contemporary policy issues such as environmental tax reforms or trade restrictions (e.g. the implementation of import tariffs and quotas). The single country model will be subsequently extended towards a multi-region model framework which accommodates to investigate in appropriate detail the economic impacts of multilateral policy initiatives such as trade policy reforms or international climate agreements.

Recommended reading:

Links:

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: jährlich/annual
Module capacity: 14

Module level:

Type of module:

Teaching/Learning method:

Previous knowledge:

Examination:

Examination times:

Type of examination:
aus der Prüfungsordnung zu entnehmen - to be taken from the examination regulations

Final exam of module:

end of semester

Type of course:

Comment: SWS Frequency Workload of compulsory attendance

Lecture
2 WiSe 28
Seminar
2 WiSe 28

Total module attendance time:

56 h
# Empirical Methods

**wir875 - Forecasting Methods**

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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Empirical Methods
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule UF - VWL
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)
- Master's Programme Computing Science (Master) > Module aus anderen Studiengängen

**Responsible persons**
- Stecking, Ralf Werner (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Skills to be acquired in this module**
With successful completion of the course, students shall:
- be aware of and be able to evaluate quantitative forecasting methods.
- be able to select adequate methods in relevant fields of application, like time series and classification analysis.
- be able to run computer-aided analyses and to interpret the results properly.

**Module contents**
Various aspects of quantitative forecasting methods such as:
- Time series components,
- Trend and seasonal methods,
- Stationarity,
- Multivariate forecasting methods,
- Autoregressive and moving average processes,
- Box-Jenkins method.

**Recommended reading**

**Links**
- Language of instruction | English
- Duration (semesters) | 1 Semester
- Module frequency | halbjährlich
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Total module attendance time 56 h
**wir887 - Advanced Econometrics**

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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Empirical Methods

**Responsible persons**
- Huse, Cristian (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Huse, Cristian (Module counselling)

**Prerequisites**
**Skills to be acquired in this module**
Be able to conceptually understand, critically evaluate, and apply methods used in the statistical analysis of data.

**Module contents**
Introduction to statistical software; Econometrics review; Econometrics and statistical learning methods (Classification, Resampling, Model selection and regularization, Nonlinear models, Tree-based methods, Unsupervised learning); Applications to Economics.

**Recommended reading**
- Papers to be assigned in due course

**Links**
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: 
- Module capacity: 30
- Module level:
- Type of module:
- Teaching/Learning method:

**Previous knowledge**

**Final exam of module**
- At the end of the lecture period

**Type of course module**

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<th>Comment</th>
<th>SWS</th>
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### Module label
Applied Econometrics Using GIS Techniques

### Module abbreviation
wir888

### Credit points
6.0 KP

### Workload
180 h

### Applicability of the module
- Master Applied Economics and Data Science (Master) > Empirical Methods

### Responsible persons
- Gören, Erkan (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

### Prerequisites
None

### Skills to be acquired in this module
This course provides an introduction to some fundamental geo-processing operations using ArcGIS that are most relevant for economics research. The broad term GIS encompasses a set of tools (both software and hardware) to collect, store, visualize and analyze spatial data from the real world. GIS techniques allow economists to use data on geography and weather as sources of exogenous variation for estimating the causal impact of a wide range of treatments (e.g., infrastructure, mass media, slave trade, land suitability for agriculture, and terrain ruggedness). Satellite images from the earth's surface, which can be analyzed with geo-processing tools in GIS, allow economists to construct geo-spatial indicators (e.g., temporal changes in the intensity of night-time light and patterns of deforestation) that more closely reflect the local actors and underlying mechanisms of interest.

### Module contents
- Gain practical experience with the implementation of geo-processing tools using ArcGIS.
- Application of GIS programming tools that are most relevant for economics research through replication of various pieces of empirical economics research papers.
- A non-exhaustive list of geo-processing tools using ArcGIS includes performing mathematical functions on spatial data, the calculation of geographic distances between various forms of spatial units, aggregating geospatial data within polygons, and drawing maps.
- Introduction to map projection and geographic coordinate systems.
- Introduction to programming in Python for the purpose of automation and replication of geo-processed spatial datasets.
- Acquire the necessary data management skills to export spatial data in a suitable file format that can be directly imported into standard econometric software packages such as Stata.

### Recommended reading

### Links

### Languages of instruction
German, English
<table>
<thead>
<tr>
<th>Duration (semesters)</th>
<th>1 Semester</th>
</tr>
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<td>Previous knowledge</td>
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<td>Mündliche Prüfung oder Klausur oder Referat oder Projektbericht</td>
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**wir891 - Complex Data Analysis**

**Module label**  | Complex Data Analysis  
**Module abbreviation**  | wir891  
**Credit points**  | 6.0 KP  
**Workload**  | 180 h  
**Applicability of the module**  
- Master Applied Economics and Data Science (Master) > Empirical Methods  
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule AFT - Methoden  
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule NM - Methoden  
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule UF - Methoden  
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules  
**Responsible persons**  
- Stecking, Ralf Werner (module responsibility)  
- Lehrende, Die im Modul (authorised to take exams)  
**Prerequisites**
**Skills to be acquired in this module**  
With successful completion of the course, students shall be able to analyze complex empirical data sets, like aggregated data, privacy constrained data, distance information, distributions, tables, symbolic or granular data. Students will also learn to handle issues of big data challenges: large number of cases or variables, unknown dependencies, redundancy, missing values, small or no variance. In this course students will learn theoretical aspects of complex data analysis, as well as practical applications for real data sets with statistical software packages.  
**Module contents**  
Principal Component Analysis, Correspondence Analysis, Cluster Analysis, Linear Discriminant Analysis, Multidimensional Scaling, CART, Symbolic Data Analysis

**Recommended reading**

**Links**

**Languages of instruction**  | German, English  
**Duration (semesters)**  | 1 Semester  
**Module frequency**  |  
**Module capacity**  | unlimited  
**Module level**  |  
**Type of module**  |  
**Teaching/Learning method**  |  
**Previous knowledge**
**Examination**
**Final exam of module**  
Am Ende der Vorlesungszeit  
Klausur oder Mündliche Prüfung oder Hausarbeit oder Referat  
**Type of course**  
| Comment | SWS | Frequency | Workload of compulsory attendance  
| Lecture | 2 | SoSe oder WiSe | 28  
| Seminar | 2 | SoSe oder WiSe | 28  
**Total module attendance time**  | 56 h
### wir892 - Computational Economics

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<td>• Master's programme Social Sciences (Master) &gt; Wahlpflichtmodule anderer Institute und Departments</td>
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<td>• Master's Programme Sustainability Economics and Management (Master) &gt; Additional Modules</td>
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</tr>
<tr>
<td></td>
<td>• Böhninger, Christoph (module responsibility)</td>
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<td>• Lehrenden, Die im Modul (authorised to take exams)</td>
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<td>• Riesenbeck, Lukas (Module counselling)</td>
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<td></td>
<td>• Schürer, Laura (Module counselling)</td>
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<td>Prerequisites</td>
<td>None</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>Computer-based simulations play a key role for quantifying the economic impacts of policy reforms. Among numerical simulation methods, computable partial equilibrium (CPE) models are widely used in applied economic analysis. These models build on microeconomic theory for describing supply and demand behavior of economic agents on markets. Students will learn how to program such models and apply them to the impact assessment of trade, fiscal, or environmental policies.</td>
</tr>
<tr>
<td>Module contents</td>
<td>In the course, we start from basic microeconomic theory to describe the supply-side and demand-side responses on economic markets triggered by regulatory policy measures such as taxes or subsidies. We then translate simple theoretical models into computable partial equilibrium (CPE) models and use empirical data for model parametrization. Subsequently, the CPE models are used to quantify the economic efficiency impacts and the economic incidence of policy instruments such as taxes, subsidies, standards or quotas. For the implementation of the simulation models on the students' PC we will learn a powerful state-of-the-art modeling language called GAMS (Generic Algebraic Modeling System) which initially had been developed for World Bank economists. The fundamental strength of GAMS lies in the ease with which algebraic models in economics and management (or other sciences) can be formulated and solved. Students enrolled to the course will receive a free GAMS license. For the examination, the students will be requested to adapt a basic market model towards a policy issue of their choice and provide a small written essay (max. 10 pages) on their applied analysis. For this, the students can team up in groups with 2 people and hand in their essay until the end of the summer semester.</td>
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<tr>
<td>Recommended reading</td>
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<tr>
<td>Links</td>
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<td>Teaching/Learning method</td>
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<tr>
<td>Previous knowledge</td>
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<tr>
<td>Examination</td>
<td>Examination times</td>
</tr>
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<td>Final of module</td>
<td>At the end of the lecture period</td>
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<td>Type of examination</td>
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<td>Type of course</td>
<td>Comment</td>
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<td>SWS</td>
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<td>Frequency</td>
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<tr>
<td>Lecture</td>
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wir894 - Econometrics of Policy Evaluation

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<td>Workload</td>
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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Empirical Methods
- Master's programme Business Administration: Management and Law (Master) > Basismodule
- Master's Programme Sustainability Economics and Management (Master) > Basic and Accentuation Modules

**Responsible persons**
- Huse, Cristian (module responsibility)
- Huse, Cristian (Module counselling)

**Prerequisites**

**Skills to be acquired in this module**
- Be able to conceptually understand and apply key empirical methods used by any economist (and other professionals) in the evaluation of policies.
- Be able to perform and critically evaluate an empirical analysis.

**Module contents**
- Econometric methods (Causality, Randomization, Regression discontinuity, Difference-in-differences, topics in Microeconometrics); applications.

**Recommended reading**

**Links**

**Language of instruction**
- English

**Duration (semesters)**
- 1 Semester

**Module capacity**
- 60

**Module level**

**Type of module**

**Teaching/Learning method**

**Previous knowledge**

**Examination**
- Examination times
- Type of examination

**Final exam of module**
- At the end of the lecture period
- Portfolio

**Type of course**
- Lecture

**SWS**
- 4

**Frequency**
- SoSe oder WiSe

**On-site workload**
- 56 h
This course provides an introduction to spatial econometrics modelling that are particularly appropriate to analyse real-world phenomena of spatial dependence among geographically proximate units. With successful completion of the course, students shall be able to identify spatial diffusion processes across various empirical settings and to have a thorough understanding in the application, estimation, and interpretation of the relevant spatial regression models.

**Module contents**

- The formal expression of spatial dependence.
- Modelling, estimation, and interpretation of spatial econometric models for cross-sectional, panel, and dynamic spatial panel data.
- Gain practical experience with the implementation of spatial econometric models using appropriate econometrics software packages.

**Recommended reading**


**Links**

- **Language of instruction**: English
- **Duration (semesters)**: 1 Semester
- **Module frequency**: jährlich
- **Module capacity**: unlimited
- **Module level**

**Type of module**

**Teaching/Learning method**

**Previous knowledge**

**Examination**

**Examination times**

**Type of examination**

**Final exam of module**

**Am Ende der Vorlesungszeit**

**Mündliche Prüfung oder Klausur oder Referat oder Projektbericht**

**Type of course**

**Comment**

**SWS**

**Frequency**

**Workload of compulsory attendance**

| Lecture | 2 | SoSe oder WiSe | 28 |
| Seminar | 2 | SoSe oder WiSe | 28 |

**Total module attendance time**

56 h
Data Science

inf535 - Computational Intelligence I

<table>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
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</table>

**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Data Science
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodulu des der Informatik
- Master's Programme Computing Science (Master) > Angewandte Informatik
- Master's Programme Engineering of Socio-Technical Systems (Master) > Embedded Brain Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems (Master) > Human-Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems (Master) > Systems Engineering
- Master's Programme Environmental Modelling (Master) > Mastermodule

**Responsible persons**
- Kramer, Oliver (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Prerequisites**
Basics of statistics

**Skills to be acquired in this module**
After successful completion of the course, students should have acquired the ability to master the presented methods in theory and practice. The students should be able to recognize and model corresponding optimization and data analysis problems themselves and to apply the methods unerringly.

- **Professional competence**
  - The students:
    - recognise optimisation problems
    - implement simple algorithms of heuristic optimisation
    - 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 with reference to peers
    - realize personal limitations
    - adapt own problem solving approaches with reference to required method competences

**Module contents**
Computational Intelligence comprises intelligent and adaptive methods for optimisation and learning. The module "Computational Intelligence I" 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.

**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

Recommended reading


Links

Languages of instruction
English, German

Duration (semesters)
1 Semester

Module frequency
annual

Module capacity
unlimited

Module level

Type of module

Teaching/Learning method
1VL + 1Ü

Previous knowledge
Basics of statistics

Examination
Examination times
Type of examination

Final exam of module
At the end of the lecture period
Written or oral exam

Type of course
Comment
SWS
Frequency
Workload of compulsory attendance

Lecture
2
WiSe
28

Exercises
2
WiSe
28

Total module attendance time
56 h
inf536 - Computational Intelligence II

**Module label**
Computational Intelligence II

**Module abbreviation**
inf536

**Credit points**
6.0 KP

**Workload**
180 h

**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Data Science
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik
- Master's Programme Computing Science (Master) > Angewandte Informatik
- Master's Programme Engineering of Socio-Technical Systems (Master) > Embedded Brain Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems (Master) > Human-Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems (Master) > Systems Engineering
- Master's Programme Environmental Modelling (Master) > Mastermodule

**Responsible persons**
- Kramer, Oliver (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Prerequisites**
useful previous knowledge: Linear Algebra, Stochastics

**Skills to be acquired in this module**

In the lecture "Convolutional Neural Networks" you will learn the basics of Convolutional Neural Networks, from methodological understanding to implementation.

**Professional competence**
The Students:

- will learn Deep Learning expertise, which are essential qualifications as AI experts and Data Scientists.

**Methodological competence**
The Students:

- learn the methods mentioned as well as the implementation in Python, NymPy and Keras.

**Social competence**
The Students:

- are encouraged to discuss the taught content in groups and work together to implement the programming tasks in the exercises

**Self-competence**
The Students:

- are guided to conduct independent research on advanced methods as the teaching field changes dynamically

**Module contents**
Students learn the basics of machine learning and in particular the topics of dense layers, cross-entropy, backpropagation, SGD, momentum, Adam, batch normalization, regularization, convolution, pooling, ResNet, DenseNet, and convolutional SOMs

**Recommended reading**
- Deep Learning by Aaron C. Courville, Ian Goodfellow und Yoshua Bengio

**Links**
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<td>useful previous knowledge: Linear Algebra, Stochastics</td>
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<td>Examination times</td>
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<td>Type of examination</td>
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<td>written exam, e-exam</td>
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inf604 - Business Intelligence I

Module label: Business Intelligence I
Module abbreviation: inf604
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master Applied Economics and Data Science (Master) > Data Science
- Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodule Bereich Wirtschaftsinformatik
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik
- Master's Programme Computing Science (Master) > Angewandte Informatik
- Master's Programme Engineering of Socio-Technical Systems (Master) > Embedded Brain Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems (Master) > Human-Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems (Master) > Systems Engineering

Responsible persons:
- Marx Gómez, Jorge (authorised to take exams)
- Lehrenden, Die im Modul (authorised to take exams)

Prerequisites:
No participant requirement

Skills to be acquired in this module:

Objective of the module/skills:
Current module provides basics of business intelligence with focus on enterprises and strong emphasis on data warehousing technologies. Students of the course are provided with knowledge, which reflects current research and development in a data analytic domain.

Professional competence
The students:
- name and recognize the role of business intelligence as part of daily business process
- being able to analyse advantages and disadvantages of different approaches and methods of the data analytics and being able to apply them in simple case studies
- obtain theoretical knowledge about data collection and modelling processes, including most applicable approaches and best practices

Methodological competence
The students:
- being able to execute typical tasks of business intelligence, and also being able to deepen knowledge on different approaches and methods
- gain a hands on experience and being able to understand advantages and disadvantages of different methods and being able to use obtained knowledge in most efficient ways

Social competence
The students:
- build solutions based on case studies given to the group, for example solving the issue of a factless fact table
- discuss solutions on a technical level
- present obtained case studies solutions as part of the exercises

Self-competence
The students:
- critically review provided data and information

Module contents:
Data warehouse technology together with business intelligence are increasingly being used by business in order to get better decision support and enrich ongoing processes with data-rich decisions. Data warehouse technology enables an integration of data from heterogeneous sources, whether business intelligence builds data processing on top of it. For instance, business intelligence allows to build reporting on very large volumes of data (including historical) coming primarily from data warehouse.

As past of the current module following contents are taught:
• Definition and scope of business intelligence.
• Procedures and objectives of data warehousing.
• Process of extracting, transforming and loading (ETL) of data.
• Phases of data modelling, data capturing and reporting in conjunction with a plausible case studies/scenarios.
• Prospects for further and evolving topics for business intelligence (e.g. Adaptive Business Intelligence, In-Memory Computing, etc.)
• Introduction to Data Mining.
• Case studies based practical exercises and assessments in order to impart practical knowledge.

Recommended reading

- Marx Gömez, Rautenstrauch, Cissek (2008): Einführung in die Business Intelligence mit SAP NetWeaver 7.0.

Links

- [http://www.wi-ol.de](http://www.wi-ol.de)

Languages of instruction

- German, English

Duration (semesters)

- 1 Semester

Module frequency

- annual

Module capacity

- unlimited

Module level

Type of module

- 1VL + 1Ü

Previous knowledge

- none

Examination

- Examination times
  - At the end of the lecture period
- Type of examination
  - Written exam max. 120 minutes

Final exam of module

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Total module attendance time

- 56 h
inf607 - Business Intelligence II

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<td>• Marx Gómez, Jorge (authorised to take exams)</td>
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<td>• Lehrenden, Die im Modul (authorised to take exams)</td>
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<tr>
<td>Skills to be acquired in this module</td>
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<td>Current module provides advanced business intelligence, data science with focus on enterprises and strong emphasis on big data and data analytics. Students of the course are provided with knowledge, which reflects current research and development in a data analytics domain.</td>
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<tr>
<td>Professional competence</td>
<td>The students:</td>
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<tr>
<td></td>
<td>• name and recognize the role of data analytics / data science as past of a daily business process in a particular company</td>
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<td>• able to organize from management perspective data analysis project</td>
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<td>• being able to analyse advantages and disadvantages of different approaches and methods of the data analytics and being able to apply them in simple case studies</td>
</tr>
<tr>
<td></td>
<td>• obtain theoretical knowledge about data collection and modelling processes, including state of the art approaches and available best practices</td>
</tr>
<tr>
<td>Methodological competence</td>
<td>The students:</td>
</tr>
<tr>
<td></td>
<td>• being able to execute typical tasks of data analysis, and also being able to proceed deeper with respect to different approaches and methods</td>
</tr>
<tr>
<td></td>
<td>• gain a hand on experience and being able to understand advantages and disadvantages of different methods and being able to use obtained knowledge</td>
</tr>
<tr>
<td>Social competence</td>
<td>The students:</td>
</tr>
<tr>
<td></td>
<td>• build solutions based on case studies given to the group, for example design of regression model based on provided dataset</td>
</tr>
<tr>
<td></td>
<td>• discuss solutions on a technical level</td>
</tr>
<tr>
<td></td>
<td>• present obtained case studies solutions as part of the exercises</td>
</tr>
<tr>
<td>Self-competence</td>
<td>The students:</td>
</tr>
<tr>
<td></td>
<td>• critically review provided offered information</td>
</tr>
<tr>
<td>Module contents</td>
<td>After current course students will get advanced knowledge in the domains such as business intelligence and data analytics. Besides that, students will have a chance to have a deeper look into related technical fields such as InMemory Computing, Data Mining and Machine Learning, Big Data Processing with Distributed Systems (e.g. Apache Hadoop / Spark) from both, research and practical, perspectives. Students will be provided with real-world experience gather from business intelligence and data science related projects. Materials of the course are believed to be justified with current demands of data analytics market. Thus, providing students with relevant knowledge in order to give them advantages in future job.</td>
</tr>
</tbody>
</table>
Recommended reading

- Jürgen Cleve, Uwe Lämmel (2014): "Data mining" (Deutsch)
- Max Bramer (2013): "Principles of data mining" (English)
- Ian Witten, Eibe Frank, Mark Hall (2011): "Data mining : practical machine learning tools and techniques" (English)
- Jure Leskovec, Anand Rajaraman, Jeffrey Ullman (2014): "Mining of massive datasets" (English)

Links

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

Languages of instruction

German, English

Duration (semesters)

1 Semester

Module frequency

annual

Module capacity

unlimited

Module level

Type of module

Teaching/Learning method

1VL + 1S

Previous knowledge

none

Examination

Examination times

Type of examination

Final exam of module

At the end of the lecture period

Written exam (max. 120 min.)

Type of course | Comment | SWS | Frequency | Workload of compulsory attendance
--- | --- | --- | --- | ---
Lecture | | 2 | SoSe | 28
Exercises | | 2 | SoSe | 28

Total module attendance time

56 h
**inf980 - Introduction to Computer Science**

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**Applicability of the module**

- Bachelor's Programme Biology (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Biology (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Business Administration and Law (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Business Administration and Law (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Business Informatics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Business Informatics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Computing Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Computing Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Economics and Business Administration (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Economics and Business Administration (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Engineering Physics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Engineering Physics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Environmental Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Environmental Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Intercultural Education and Counselling (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Intercultural Education and Counselling (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Mathematics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Mathematics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Physics, Engineering and Medicine (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Physics, Engineering and Medicine (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Social Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Social Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Sustainability Economics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor’s Programme Sustainability Economics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor’s Programme Sustainability Economics (Bachelor) > Wahlpflichtbereich
- Dual-Subject Bachelor’s Programme Art and Media (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Art and Media (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Biology (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Biology (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Chemistry (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Chemistry (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Computing Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Computing Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Dutch Linguistics and Literary Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Dutch Linguistics and Literary Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Economic Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Economic Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Economics and Business Administration (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Economics and Business Administration (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Elementary Mathematics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Elementary Mathematics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme English Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme English Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Gender Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Gender Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme General Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme General Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme German Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme German Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme History (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme History (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-subject bachelor's programme Low German (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-subject bachelor's programme Low German (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Material Culture: Textiles (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Material Culture: Textiles (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Mathematics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor’s Programme Mathematics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor’s Programme Music (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Music (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Philosophy / Values and Norms (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Philosophy / Values and Norms (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Physics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Physics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Politics-Economics (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Politics-Economics (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Protestant Theology and Religious Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Protestant Theology and Religious Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Slavic Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Slavic Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Social Studies (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Social Studies (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Special Needs Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Special Needs Education (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Sport Science (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Sport Science (Bachelor) > Säule "Überfachliche Professionalisierung"
- Dual-Subject Bachelor's Programme Technology (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Dual-Subject Bachelor's Programme Technology (Bachelor) > Säule "Überfachliche Professionalisierung"
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft (Bachelor) > Säule "Überfachliche Professionalisierung"
- Master Applied Economics and Data Science (Master) > Data Science
- Master's Programme Environmental Modelling (Master) > Mastermodule

**Responsible persons**
- Vogel-Sonnenschein, Ute (module responsibility)
- Vogel-Sonnenschein, Ute (authorised to take exams)
- Lehrenden, Die im Modul (authorised to take exams)

**Prerequisites**
Diese Modul wendet sich an Studierende in Studiengängen außerhalb der Informatik. Studierende des Departments für Informatik der Bachelor- und Master-Studiengänge Informatik und Wirtschaftsinformatik gehören nicht zur Zielgruppe.

**Skills to be acquired in this module**

**Module contents**
- Computer representation of information
- formal languages, grammar and automata
- basic data structures;
- problem solving paradigms, algorithms and complexity;
- programming in the small (Language: Python)
- basic concepts of data bases

**Recommended reading**
see literature lists in StudIP

**Links**
<table>
<thead>
<tr>
<th>Languages of instruction</th>
<th>German, English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>jeweils im Wintersemester</td>
</tr>
<tr>
<td>Module capacity</td>
<td>unlimited</td>
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### Module level

<table>
<thead>
<tr>
<th>Type of module</th>
<th></th>
</tr>
</thead>
</table>

### Teaching/Learning method

### Previous knowledge

### Examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>Examination times</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>2 weeks after the end of the lecture</td>
<td>written or oral exam</td>
</tr>
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</table>

### Examination times

<table>
<thead>
<tr>
<th>Type of course</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>3</td>
<td>WiSe</td>
<td>42</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>1</td>
<td>WiSe</td>
<td>14</td>
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</table>

### Total module attendance time

<table>
<thead>
<tr>
<th>Total module attendance time</th>
<th>56 h</th>
</tr>
</thead>
</table>
inf040 - Introduction to Data Science

<table>
<thead>
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<th>Introduction to Data Science</th>
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</thead>
<tbody>
<tr>
<td>Module abbreviation</td>
<td>inf040</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
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</tbody>
</table>

Applicability of the module

- Bachelor's Programme Business Informatics (Bachelor) > Akzentsetzungsbereich Praktische Informatik und Angewandte Informatik
- Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - Wahlpfad Informatik
- Bachelor's Programme Sustainability Economics (Bachelor) > Wahlpflichtbereich
- Master Applied Economics and Data Science (Master) > Data Science
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Abschlussmodul more...
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik)
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Theoretische Informatik)
- Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Mastermodule
- Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Akzentsetzungsbereich
- Master's Programme Computing Science (Master) > Praktische Informatik

Responsible persons

- Wingerath, Wolfram (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

Prerequisites

Basics of databases, Python programming and statistics

Skills to be acquired in this module

The module teaches fundamentals from the field of Data Science, covering purposes, challenges, and common best practices.

Professional competences

The students

- have knowledge of basic concepts, problems and solution approaches from the field of Data Science.
- are able to justify the choice of specific data analysis methods for a given problem
- include possible imponderables in the analysis when evaluating analysis results

Methological competences

The students

- are able to translate questions from a specific domain into a feasible analysis
- work on Data Science tasks to expand their understanding of the different approaches and methods.

Social competences

The students

- discuss approaches and problems encountered in smaller and larger groups

Self competences

The students

- reflect on their actions when identifying possible solutions and critically question their own results

Module contents

Data Science is an interdisciplinary science at the intersection of statistics,
This course is designed to provide a practical introduction to the field of Data Science by teaching theoretical principles while also applying them practically. Topics covered range from data collection and preparation (data sources & formats, data cleaning, data bias), mathematical foundations (statistical distributions, correlation analysis, significance) and methods for visualization (tables & plots, histograms, best practices) to the development of models for classifying or predicting values (linear regression, classification, clustering).

<table>
<thead>
<tr>
<th>Recommended reading</th>
<th>See description of the assigned course</th>
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</thead>
<tbody>
<tr>
<td>Links</td>
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<td>Duration (semesters)</td>
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<td>Module capacity</td>
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<td>Module level</td>
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<td>Type of module</td>
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<td>Teaching/Learning method</td>
<td>1VL + 1Ü</td>
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<td>Previous knowledge</td>
<td>Basics of databases, Python programming and statistics</td>
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<tr>
<td>Examination</td>
<td>Examination times</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>Written or oral exam or portfolio or project or practical exercise</td>
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At the end of the lecture period or by arrangement with the instructor.

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<th>Type of course</th>
<th>Comment</th>
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inf962 - Fundamental Competencies in Computing Science III: Algorithms and Computational Problem Solving

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<td>Workload</td>
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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Data Science
- Master's Programme Engineering of Socio-Technical Systems (Master) > Fundamentals/Foundations
- Master's Programme Environmental Modelling (Master) > Mastermodule

**Responsible persons**
- Vogel-Sonnenschein, Ute (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Prerequisites**
No specific knowledge is required to take part in this module.

**Skills to be acquired in this module**

Graduates of the module have acquired a deeper understanding of basic theories and techniques in computer science and can classify problems that arise. This enables students to structure and model simple tasks from their subject area using computer science, to design approaches to solutions and to estimate the effort required to solve them. They have a basic understanding of the design and use of relational databases.

This course provides students with fundamental computational problem-solving skills necessary to complete subsequent courses in computer science.

**Professional competences**

The students
- name the basic concepts of von Neumann's computer architecture,
- describe concepts of the computational representation of information and their limits,
- use basic data structures and algorithms and reason about their complexity,
- model simple problems with formal concepts such as automata and formal languages,
- design simple relational databases and identify the advantages of database-based storage.

**Methodological competences**

The students
- analyze problems from their area of application,
- design appropriate solutions for simple problems using the Python programming language and estimate the effort required to execute them,
- design simple object-oriented models
- use a simple IDE and implement scripts in Python,
discuss alternative computational representations of data and problems and draw informed conclusions from them

Social competences
The students

• present and discuss their solutions in an interdisciplinary team,
• develop solutions to simple problems cooperatively in a team.

Self-competences
The students

• critically reflect on fundamental design decisions in algorithms and data structures,
• deepen their time management skills.

Module contents

• von Neumann computer architecture,
• tasks of operating systems
• computer representation of information,
• formal languages, grammar and automata,
• basic data structures,
• algorithms and complexity,
• programming simple object-oriented solutions in Python
• basic concepts of SQL-based databases

Recommended reading

Links

Language of instruction English
Duration (semesters) 1 Semester
Module frequency every winter semester
Module capacity unlimited
Reference text This module provides students with non-computer science backgrounds with the computational problem-solving skills necessary to complete subsequent computer science courses. It is not intended for students with a computer science background.

Module level

Type of module

Teaching/Learning method 1VL + 1Ü
Previous knowledge none
Examination Examination times Type of examination
Final exam of module

• The exam takes place in the first three weeks after the end of the event period.
• The re-exam takes place in the last three weeks before the start of the next event period.
• Practical exercises and exams or
• Practical exercises and oral examination (with fewer than 20 participants)

Type of course Comment SWS Frequency Workload of compulsory attendance
Lecture 3 WiSe 42
Exercises 1 WiSe 14
Total module attendance time 56 h
## Specialization

**inf007 - Information Systems I**

<table>
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<tbody>
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<td>Workload</td>
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**Applicability of the module**
- Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum - Pflichtbereich
- Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule
- Bachelor's Programme Economics and Business Administration (Bachelor) > Studienrichtung Wirtschaftsinformatik
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Aufbaumodule (60 KP)
- Master Applied Economics and Data Science (Master) > Specialization
- Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Pflichtbereich

**Responsible persons**
- Wingerath, Wolfram (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Prerequisites**
- No participant requirement

**Skills to be acquired in this module**

This module introduces the core concepts, languages and architectures of databases. In software systems these concepts are important.

**Professional competence**

The students:
- name the core concepts of the languages and architectures of databases (especially)
- select data models
- integrate structuring concepts of information systems in their designs

**Methodological competence**

The students:
- design database systems appropriately
- analyse problems from the field of database-supported information systems and solve them appropriately

**Social competence**

The students:
- enhance their ability to work in a team

**Self-competence**

The students:
- reflect their problem-solving behaviour with regard to the information processing concepts

**Module contents**

- Relational data models
- Relational algebra and its implementation in SQL (the standard of databases)
- Database design on different abstractions (conceptual and logical design)
- Normalisation - Data base architectures
- Distributed and active databases
- Object-oriented, object-related and XML-based database systems

**Recommended reading**

<table>
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<tbody>
<tr>
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<tr>
<td>Teaching/Learning method</td>
<td>1VL + 1Ü</td>
</tr>
<tr>
<td>Previous knowledge</td>
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</tr>
<tr>
<td>Examination</td>
<td>Examination times</td>
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<tr>
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inf008 - Information Systems II

Module label: Information Systems II
Module abbreviation: inf008
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module
- Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum-Wahlbereich Praktische Informatik
- Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsrichtung - Wahlbereich Informatik
- Bachelor's Programme Economics and Business Administration (Bachelor) > Studienrichtung Wirtschaftsinformatik
- Master Applied Economics and Data Science (Master) > Specialization
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Wahlpflichtmodule (Praktische Informatik)
- Master's Programme Business Informatics (Master) > Akzentsetzungsmoduls der Informatik

Responsible persons
- Grawunder, Marco (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

Prerequisites
No participant requirement

Skills to be acquired in this module

Professional competence
The students:
- know further concepts, languages and architectures of databases
- analyse advanced information processing tasks
- analyse complex requirements of information systems appropriately
- realize information requirements and gather relevant information

Methodological competence
The students:
- propose concrete processing principles for special application classes
- reflect specific technologies' consequences and proceedings

Social competence
The students:
- improve their ability to work in a team

Self-competence
The students:
- reflect their problem-solving behaviour with regard to extended information processing concepts

Module contents
- Implementation of databases (architecture, index structures, query processing and optimization)
- Data integration and data analysis (data integration, data warehouses, data mining)
- Information retrieval
- Parallel databases

Recommended reading
Suggested reading:
- Härder, T., Rahm, E.: Datenbanksysteme - Konzepte und Techniken der Implementierung, Morgan Kaufmann
- U. Leser, F. Naumann. Informationsintegration: Architekturen und Methoden zur Integration verteilter und heterogener Datenquellen. dpunkt
- Bauer/Günzel. Data-Warehouse-Systeme, dpunkt
- Han/Kamber/Pei. Data Mining: Concepts and Techniques, Morgan Kaufmann
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<tr>
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inf109 - Information Systems III

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<td>Workload</td>
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</table>
| Applicability of the module                    | Master Applied Economics and Data Science (Master) > Specialization  
Master's Programme Business Informatics (Master) > Akzentsetzungsmodul der Informatik  
Master's Programme Computing Science (Master) > Praktische Informatik |
| Responsible persons                            | Grawunder, Marco (module responsibility)  
Lehrenden, Die im Modul (authorised to take exams) |
| Prerequisites                                   | - Information Systems I  
- Information Systems II  
- JAVA |
| Skills to be acquired in this module           | Professional competence  
The students:
  - describe concepts, languages and architectures of database systems  
  - discuss state-of-the-art database research topics  
  - analyse information processing tasks and implement solutions appropriately  
Methodological competence  
The students:
  - propose concrete processing requirements for special application classes  
  - assess the consequences of techniques and approaches  
  - perform supervised research in the field of information systems  
  - analyse and reflect complex information system requirements  
  - realize information demands and accordingly gather aim-oriented information  
Social Competencies  
The students:
  - solve problems partially in small groups  
  - present solution proposals in front of the exercise group  
  - discuss their different solution proposals within the exercise group  
Self-competences  
The students:
  - accept constructive criticism  
  - reflect on their proposed solution considering the taught methods  
Module contents                                  | This module is a continuation of the content of information systems I and II. It deepens and extends the contents of the preceding modules and focuses mainly on current research questions. A special focus lies on concept of distributed data management. |
Recommended reading                              | Özsu, M. Tamer; Valduriez, Patrick, Principles of distributed database systems  
Rahm/Saake/Sattler: Verteiltes und Paralleles Datenmanagement, Springer  
Paper from SIGMOD, VLDB or ICDE |
Links                                           | Languages of Instruction: German, English |
Duration (semesters)                             | 1 Semester |
Module frequency                                | Winter semester |
Module capacity                                  | unlimited |
### Module level

**Type of module**

- **Teaching/Learning method**: 1VL + 1Ü

**Previous knowledge**

- Information Systems I
- Information Systems II
- JAVA

**Examination**

- **Examination times**: At the end of the lecture period
- **Type of examination**: Written exam, oral exam or term paper

<table>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
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<tr>
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<td>2</td>
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<td>28</td>
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**Total module attendance time**: 56 h
**inf510 - Energy Information Systems**

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<td>6.0 KP</td>
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<td>Workload</td>
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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Specialization
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik
- Master's Programme Computing Science (Master) > Angewandte Informatik
- Master's Programme Environmental Modelling (Master) > Mastermodule

**Responsible persons**
- Lehnhoff, Sebastian (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**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
### Recommended reading

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

### Links

<table>
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<th>English</th>
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<tr>
<td>Final exam of module</td>
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</tr>
<tr>
<td>At the end of the semester</td>
<td>Student research project or presentation</td>
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### Examination

- Final exam of module: At the end of the semester
- Type of examination: Student research project or presentation

### Type of course

<table>
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<th>Type of course</th>
<th>Comment</th>
<th>SWS</th>
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<td>WiSe</td>
<td>28</td>
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### Total module attendance time

- 56 h
### wir842 - Banking

<table>
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<th>Module label</th>
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<tbody>
<tr>
<td>Module abbreviation</td>
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<td>Workload</td>
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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Specialization
- Master of Education Programme (Vocational and Business Education) Economics and Business Administration (Master of Education) > Mastermodule
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule AFT - BWL
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - BWL
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)

**Responsible persons**
- Prokop, Jörg (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

**Prerequisites**

**Skills to be acquired in this module**
Upon completion of the module students will be able to explain the role financial institutions play in financial markets based on economic theory. They will have a sound knowledge of institutional and regulatory conditions under which financial institutions operate today, and they will be able to critically assess respective developments in the financial sector. Moreover, they will have developed a sound understanding of how banks are managed in a competitive environment.

**Module contents**
We will discuss theoretical foundations of financial intermediation in general, and of banking in particular as well as the economic, institutional, and regulatory context in which financial institutions operate today. Moreover, we will cover selected topics in the area of bank management and bank accounting.

**Recommended reading**
- Berger / Molyneux / Wilson (Eds.): The Oxford Handbook of Banking, latest edition, Oxford University Press
- Tolkmitt: Neue Bankbetriebslehre, latest edition, Gabler

Further readings may be announced during the course.

**Languages of instruction**
German, English

**Duration (semesters)**
1 Semester

**Module capacity**
unlimited

**Module level**

**Type of module**

**Teaching/Learning method**

**Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Examination times</th>
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<td>typically at the end of the semester; potential mid-term examination dates will be announced in the first session</td>
<td>1 term paper (Hausarbeit) or 1 written exam (Klausur) or 1 oral exam (mündliche Prüfung) or 1 Portfolio</td>
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**Type of course**
Lecture

**SWS**
4

**Frequency**

**On-site workload**
56 h
## wir843 - Financial Risk Management

<table>
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### Applicability of the module
- Master Applied Economics and Data Science (Master) > Specialization
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule AFT - BWL
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - BWL

### Responsible persons
- Lehrenden, Die im Modul (authorised to take exams)
- Prokop, Jörg (module responsibility)

### Prerequisites

### Skills to be acquired in this module
- The aim of the course is to provide students with a thorough knowledge of how to identify, classify, measure, and manage different types of financial business risks. In particular, we will discuss the properties and potential applications of derivatives in financial risk management. Upon completion of this module, students will have a sound understanding of the concept of risk management, and will be able to distinguish different types of financial risks and risk management approaches;
- will be able to devise hedging strategies, arbitrage strategies, and speculative strategies using financial derivatives such as futures contracts, forward contracts, options, and swaps;
- will be able to consistently apply valuation models to determine theoretical prices of financial derivatives.
- will be able to assess limitations of financial derivatives in risk management.

### Module contents
- The course provides insights into the theory and practice of modern financial business risk management, including:
  - the concept of risk, types of financial risks, and approaches to risk measurement;
  - the mechanics of financial markets, including derivatives markets;
  - the properties of selected financial instruments, including financial derivatives such as forwards, futures, options, and swaps;
  - tools and techniques for managing financial risks.

### Recommended reading
- Highly recommended readings:
- Optional readings:
  - Further readings may be announced during the course.

### Links
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: halbjährlich
- Module capacity: unlimited

### Type of module
- Teaching/Learning method: Lecture (ggf. mit Übung)
- Examination times:
  - 1 term paper (Hausarbeit) or 1 written exam (Klausur) or 1 oral exam (mündliche Prüfung) or 1 Portfolio

### Examination
- Typically at the end of the semester; potential midterm examination dates will be announced in the first session

### Final exam of module
- Type of course
- Type of examination
<table>
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<tr>
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<tbody>
<tr>
<td>Frequency</td>
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<tr>
<td>On-site workload</td>
<td>56 h</td>
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</table>
wir886 - Digital Transformation: Strategies and Sustainability

Module label
Digital Transformation: Strategies and Sustainability

Module abbreviation
wir886

Credit points
6.0 KP

Workload
180 h
(4 SWS (56h))

Applicability of the module
- Master Applied Economics and Data Science (Master) > Specialization
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule NM-BWL
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - BWL
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule UF - BWL
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

Responsible persons
- Lehrenden, Die im Modul (authorised to take exams)
  - Hoppmann, Jörn (module responsibility)

Prerequisites
Skills to be acquired in this module
- The students should:
  - know basic definitions, trends and application areas of digitalization
  - be able to assess the economic effects of digitalization
  - understand corporate strategies and business models in the context of digital transformation
  - know how companies should design processes and structures to promote digitalization in organizations
  - have an overview of social, legal and ethical aspects of digitalization
  - assess the environmental impact of digitalization
  - evaluate digital products, services and business models using ethical and sustainable guidelines
  - independently develop proposals for the integration of ethical, social and ecological criteria in digitalization projects and processes

Module contents
The module "Digital Strategy and Sustainability" provides insights into the role digitalization for companies and the associated social discourse. The digital transformation leads to the emergence of new business models, markets and forms of interaction. This requires comprehensive changes in strategic orientation as well as in business processes and structures. In addition, new regulations and standards are required at the societal level in order to meet the ethical, ecological, and societal challenges posed by digitalization.

In the first part of the seminar, students are familiarized with the basics and application areas of digitalization as well as the economic, social, and ecological implications. Toward this end, important questions in the context of digital transformation will be raised and discussed drawing on company case studies. Exemplary questions that will be dealt with in this context are:
- What are the technological drivers of digitalization and what trends can be observed?
- What is the impact of digital transformation on industries and companies?
- How can companies design strategies, business models, processes and structures to address the digital transformation?
- What are the consequences of digitalization on a societal and legal level?
- How does the digital transformation affect the natural environment?
- How can social, ethical, and ecological aspects be integrated into digital products, services and business models?

In the second part of the course, students will develop digital business models in teams under the guidance of experienced coaches, taking into account economic, ecological and social/ethical criteria. The results are presented to the other students and company representatives and will be summarized in a term paper. An important part of the term paper is the critical reflection of current methods used to develop digital business models with regard to sustainability criteria.

Recommended reading

Links

Language of instruction
English
**Duration (semesters)**  
1 Semester

**Module frequency**  
Annually

**Module capacity**  
40

**Reference text**  
Das Modul sollte im 2. Semester besucht werden.

**Type of module**  
Wahlpflicht / Elective

### Teaching/Learning method

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### Type of course

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<tr>
<td>Lecture</td>
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<td>Exercises</td>
<td>2</td>
<td>SoSe oder WiSe</td>
<td>28</td>
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**Total module attendance time**  
56 h
wir896 - Operations Management

Module label: Operations Management
Module abbreviation: wir896
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master Applied Economics and Data Science (Master) > Specialization
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - BWL
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule UF - BWL
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)

Responsible persons:
- Busse, Christian (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

Prerequisites:

Skills to be acquired in this module:

Module contents:
Die Vorlesung behandelt voraussichtlich folgende Themen:
- Nachfrageprognose
- Prozessmanagement
- Produktionsplanung
- Ablaufplanung
- Revenue Management
- Behavioral Operations Management

Recommended reading:

Links:
- https://www.uni-oldenburg.de/produktion

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Module level:

Type of module:
Teaching/Learning method:

Previous knowledge:

Examination:

Final exam of module:
Am Ende des Semesters: Portfolio

Type of course:
- Lecture: 2 SWS
  - Comment: SoSe oder WiSe
  - Frequency: 28
- Seminar: 2 SWS
  - Comment: SoSe oder WiSe
  - Frequency: 28

Total module attendance time: 56 h
## wir898 - Strategic Sustainability Management

<table>
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<td></td>
<td>• Master Applied Economics and Data Science (Master) &gt; Specialization</td>
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<td>• Master's Programme Business Informatics (Master) &gt; Module der Wirtschafts- und Rechtswissenschaften (Master)</td>
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<td>• Master's Programme Sustainability Economics and Management (Master) &gt; Akzentmodule</td>
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<td>Responsible persons</td>
<td>Hoppmann, Jörn (module responsibility)</td>
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<td>Lehrenden, Die im Modul (authorised to take exams)</td>
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<td>Hoppmann, Jörn (Module counselling)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>The students should...</td>
</tr>
<tr>
<td></td>
<td>• know and understand basic concepts, instruments and theories in the context of corporate sustainability and corporate social responsibility</td>
</tr>
<tr>
<td></td>
<td>• be able to apply conceptual frameworks to analyze and critically question the sustainability of companies</td>
</tr>
<tr>
<td></td>
<td>• develop options to improve the sustainability of companies and derive recommendations for their implementation in practice</td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>The module &quot;Strategic Sustainability Management&quot; provides an overview of the debates on the role of firms for sustainable development from a strategic perspective. The first session will briefly introduce the historical debate on Corporate Sustainability and Corporate Social Responsibility and delineate important concepts. The following sessions will use concrete company case studies as a basis for a critical discussion of questions in the context of corporate sustainability that are of strategic importance for firms. Questions that will be discussed are, amongst others:</td>
</tr>
<tr>
<td>Module contents</td>
<td>• How can one determine whether a firm acts in a socially and ecologically sustainable way?</td>
</tr>
<tr>
<td></td>
<td>• Which factors drive and hinder the diffusion of socially and ecologically superior solutions and companies in the market?</td>
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<tr>
<td></td>
<td>• To which extent is there a conflict between firm and market growth on the one hand and sustainability on the other hand?</td>
</tr>
<tr>
<td></td>
<td>• Which possibilities does a company have to deal with conflicts between social/ ecological and economic goals?</td>
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<td>• How can existing firms and value chains be transformed toward sustainability?</td>
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<td>• What is the role of managers and boards of directors for organizational change toward sustainability?</td>
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<td>• How does the ownership and financial structure of firms influence their strategy toward sustainability?</td>
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<td>• In how far can cooperation and partnerships between organizations help integrate social and ecological aspects in 53 firms?</td>
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<td>In addition to discussing these questions by drawing on company case studies, students will be introduced to the corresponding theoretical concepts and frameworks in the academic literature. Also, students will be given the opportunity to test different strategies for implementing sustainability in organizations during a simulation, which allows them to gain first-hand insights into the emerging challenges. Toward the end of the course, students will apply and deepen the knowledge they have gathered over the semester by writing a seminar thesis.</td>
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<tr>
<td>Recommended reading</td>
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<td>Links</td>
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wir899 - Supply Chain Management

Module label: Supply Chain Management
Module abbreviation: wir899
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master Applied Economics and Data Science (Master) > Specialization
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - BWL
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule UF - BWL
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)

Responsible persons:
- Busse, Christian (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)

Skills to be acquired in this module:
In der zum Modul gehörigen Vorlesung werden vor allem formalanalytische Modelle erarbeitet, mit denen Probleme in Wertschöpfungsketten beschrieben und im Rahmen der Modellannahmen optimiert werden können. Hiermit sollen die Studierenden eine Kompetenz zur unternehmensübergreifenden Analyse der gesamten Wertschöpfungskette (Supply Chain) erwerben, mit Hilfe derer sie diese nicht nur verstehen, sondern idealerweise auch verbessern können. Im begleitenden Seminar werden mithilfe von in Gruppen verfassten Hausarbeiten aktuelle Fragestellungen und Diskussionen im Supply Chain Management aufgearbeitet und bewertet. Das Seminar baut ergänzend zur Vorlesung auf konzeptioneller und empirischer Forschung auf. Hiermit lernen die Studierenden wissenschaftliche Diskurse zu praktisch relevanten und nur schwer modellierbaren Herausforderungen des Supply Chain Managements kennen. Ferner werden die Fähigkeiten zum wissenschaftlichen Arbeiten, zur Teamarbeit und zum Präsentieren vor großen Gruppen trainiert.

Module contents:
Die Vorlesung behandelt voraussichtlich folgende Themen: Grundlagen der Supply Chain, Strategischer Fit, Netzwerk- und Standortplanung, Bestandsmanagement, Produkt- und Prozessdesign, Supply-Chain-Koordination, Vertragsdesign, Transport in der Supply Chain, Nachhaltiges Supply Chain Management

Recommended reading:

Links:
https://www.uni-oldenburg.de/produktion

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited

Module level:
Type of course:

Teaching/Learning method:
Previous knowledge:

Examination:
Examination times: Am Ende des Semesters
Type of examination: Portfolio

Type of course:
Comment: SWS
Frequency: Workload of compulsory attendance

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**wir921 - Sustainable Supply Chain Management**

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<td>Master Applied Economics and Data Science (Master) &gt; Specialization</td>
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<tr>
<td>Master's Programme Sustainability Economics and Management (Master) &gt; Akzentmodule</td>
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<td>Responsible persons</td>
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<tr>
<td>Busse, Christian (module responsibility)</td>
<td></td>
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<tr>
<td>Lehrenden, Die im Modul (authorised to take exams)</td>
<td></td>
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<tr>
<td>Busse, Christian (Module counselling)</td>
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<td>Prerequisites</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>By focusing on sustainability from an intra-, and inter-organizational perspective, this module aims to equip students with an in-depth knowledge of the sustainability-related challenges and problems within supply chain management and suggests some tools for managing the same. It further seeks to capacitate students to understand and analyze the trade-offs and conflicts of targets within sustainable supply chain management. The content is closely linked to the latest research in the field, providing a theoretical understanding (within the lecture) while using real-world case examples (within the seminar) to develop a practical understanding simultaneously. Students will be able to connect theory with practice and get a taste of real-life corporate scenarios or lay a foundation for possible master theses. Further, working in groups will help students brush up their team management skills, and the final report shall accustom them to the intricacies of scientific writing.</td>
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<tr>
<td>Module contents</td>
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<td>This masters-level module focuses on how firms could practically manage sustainability in its supply chains. Two broader perspectives, as detailed below, guide the coursework:</td>
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<tr>
<td>1) The material flow perspective approaches SSCM with sustainably managing physical flows and processes within a firm’s operations and upstream (and downstream) supply chain links. Individual (lecture) sessions are built around the following topics: Introduction to Sustainability and Supply Chain Management; Introduction to Sustainable Supply Chain Management; Sustainable Product Development &amp; Lean and Green; Workplace Health and Safety; Sustainable Transportation; Sustainable Warehousing &amp; Sustainable Packaging; and Closed-Loop Supply Chain Management</td>
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<td>2) The relationship perspective further adopts a more direct managerial viewpoint on inter-firm relations. Individual (lecture) sessions discuss the following topics: Stakeholder Management; Legitimacy, Decoupling &amp; Greenwashing; Supply Chain Sustainability Risks; Sustainable Supplier Management; and Supply Chain Sustainability Dilemmas</td>
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<tr>
<td>Some of the theoretical perspectives discussed within the lecture sessions will be prepared by case studies of well-known companies such as Walmart, DHL, HP, Volkswagen, Lidl, and Apple.</td>
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<tr>
<td>Recommended reading</td>
<td>The lecture content has been developed from various research publications, rather than a textbook. Students are encouraged to read some of the original publications as amendments to the lecture. The case studies will mostly be based on professionally written cases. Scholarly publications/articles, as well as the case study documents, will be provided and discussed throughout the sessions.</td>
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<tr>
<td>Links</td>
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<tr>
<td>Language of instruction</td>
<td>English</td>
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<td>Duration (semesters)</td>
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<tr>
<td>Module frequency</td>
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<td>Module capacity</td>
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<tr>
<td>Reference text</td>
<td>This module is offered in the summer term. For a more detailed description of course content and organization, please note the syllabus that will be made</td>
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available via Stud.IP before the beginning of the course.

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<td>Teaching/Learning method</td>
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<td>Previous knowledge</td>
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<tr>
<td>Seminar</td>
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wir806 - Information Technology Law

Module label | Information Technology Law
Module abbreviation | wir806
Credit points | 6.0 KP
Workload | 180 h

Applicability of the module
- Bachelor's Programme Business Informatics (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft
- Bachelor's Programme Computing Science (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft
- Master Applied Economics and Data Science (Master) > Specialization
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Pflichtmodule
- Master of Education Programme (Hauptschule and Realschule) Computing Science (Master of Education) > Recht und Gesellschaft
- Master's programme Business Administration: Management and Law (Master) > Basismodule
- Master's programme Business Administration: Management and Law (Master) > Schwerpunktmodule RdW - Recht
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)
- Master's Programme Computing Science (Master) > Module aus anderen Studiengängen

Responsible persons
- Rott, Peter (module responsibility)
- Lehrenden, Die im Modul (authorised to take exams)
- Rott, Peter (Module counselling)

Prerequisites
- not applicable

Skills to be acquired in this module
The students are familiar with the effects of digitalisation with its chances and risks in European and German private law and, in particular, consumer law. They obtain knowledge of specific areas of digitalised private law and consumer law with particular relevance for their future professional practice, are able to solve consumer law cases in a goal-oriented way, are able to find approaches for legal problems as well as recognise liability risks and how to deal with them, and are, in contract negotiations, able to recognise the requirements for regulation and to evaluate its consequences.

Module contents
This module conveys how new technologies impact on private law and, in particular, consumer law. It focuses on the (modified) interpretation of existing laws but even more on the reactions of the EU and national legislators and of the judiciary to new technological developments. The module discusses, among others, distance selling law, digitalised sales law and product liability law, the law of digital content and digital services, unfair commercial practices on internet and the law of the platform economy. Finally, the module looks at enforcement.

Recommended reading
to be announced in the first lecture

Links
Language of instruction | German
Duration (semesters) | 1 Semester
Module frequency | jährlich
Module capacity | unlimited
Module level | MM (Mastermodul / Master module)
Type of module | Wahlpflicht / Elective
Teaching/Learning method | Lecture and Seminar
Previous knowledge | basic knowledge of civil law is helpful.
Examination | Examination times
Type of examination
Final exam of module | to be taken from the examination regulations
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Total module attendance time 56 h
## Masterabschlussmodul

### mam - Master’s Degree Module

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### Applicability of the module
- Master Applied Economics and Data Science (Master) > Masterabschlussmodul

### Responsible persons

### Prerequisites

### Skills to be acquired in this module

### Module contents

### Recommended reading

### Links

### Languages of instruction
- German, English

### Duration (semesters)
- 1 Semester

### Module capacity
- unlimited

### Module level

### Type of module

### Teaching/Learning method

### Previous knowledge

### Examination

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<td>Abschlussarbeit</td>
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### Type of course
- Seminar

### SWS
- 2

### Frequency
- SoSe oder WiSe

### On-site workload
- 28 h