Specialization

inf007 - Information Systems I

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<th>Information Systems I</th>
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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
- Master Applied Economics and Data Science (Master) > Specialization
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Mastermodule
- Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Mastermodule

**Responsible persons**
- Grawunder, Marco (Authorized examiners)
- Lehrenden, Die im Modul (Authorized examiners)

**Prerequisites**

**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
- Database architectures
- Distributed and active databases
- Object-oriented, object-related and XML-based database systems

**Reader's advisory**

**Links**
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**Vorkenntnisse / Previous knowledge**

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**Course type**

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**Total time of attendance for the module** 56 h
inf008 - Information Systems II

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**Applicability of the module**
- Bachelor's Programme Business Informatics (Bachelor) > Aufbaucurriculum-Wahlbereich Praktische Informatik
- Bachelor's Programme Computing Science (Bachelor) > Akzentsetzungsbereich - 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) > Mastermodule
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodule der Informatik

**Responsible persons**
- Grawunder, Marco (Authorized examiners)
- Lehrenden, Die im Modul (Authorized examiners)

**Prerequisites**

**Skills to be acquired in this module**
The Module “Information Systems II” enhances the knowledge and the concepts of “Information Systems I”.

**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:

**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

**Reader's advisory**

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/Pel: Data Mining: Concepts and Techniques, Morgan Kaufmann
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| Total time of attendance for the module | 56 h          |
inf109 - Information Systems III

Module label: Information Systems III
Module code: inf109
Credit points: 6.0 KP
Workload: 180 h

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 (Authorized examiners)
Lehrenden, Die im Modul (Authorized examiners)

Prerequisites:

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

Module contents:
This module is a continuation of the content of Information Systems I and of Information Systems 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.

Reader's advisory:
- 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:
http://www.is.informatik.uni-oldenburg.de/lehre/lehre.html

Language of instruction:
German

Duration (semesters):
1 Semester

Module frequency:
jährlich

Module capacity:
unlimited

Module type:
je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method:

Vorkenntnisse / Previous knowledge:
- Informationssysteme I
- Informationssysteme II
- JAVA

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

Course type:
Lecture:
SWS: 2
Frequency: WiSe
Workload of compulsory attendance: 28
Exercises:
SWS: 2
Frequency: WiSe
Workload of compulsory attendance: 28

Total time of attendance for the module: 56 h
inf510 - Energy Information Systems

Module label: Energy Information Systems
Module code: inf510
Credit points: 6.0 KP
Workload: 180 h

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) > Angewandte Informatik
- Master's Programme Engineering Physics (Master) > Schwerpunkt: Renewable Energies
- Master's Programme Environmental Modelling (Master) > Mastermodule

Responsible persons
Lehnhoff, Sebastian (Authorized examiners)
Lehrrenden, Die im Modul (Authorized examiners)

Prerequisites

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

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

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

Social competence
The students:
- discuss solutions for energy management systems in the group
- develop use cases in teams
- present self-developed solutions

Self-competence
The students:
- reflect their actions with regard to structuring and decomposing systems
- reflect their own use of power as a limited resource

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

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

Reader's advisory
- Crastan V.: "Elektrische Energieversorgung II", Springer 2004
Links

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Vorkenntnisse / Previous knowledge

Examination

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Course type

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Total time of attendance for the module 56 h
wir842 - Banking

Module label: Banking
Module code: wir842
Credit points: 6.0 KP
Workload: 180 h

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, Economics and Law (Master) > Schwerpunkt "Accounting, Finance, Taxation" (AFT)
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Recht der Wirtschaft" (RdW)
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)

Responsible persons:
Prokop, Jörg (Module responsibility)
Lehrenden, Die im Modul (Authorized examiners)

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.

Reader's advisory:
- 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.

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

Languages of instruction:
German, English

Duration (semesters):
1 Semester

Module frequency:
jährlich

Module capacity:
unlimited

Modullevel / module level:
MM (Mastermodul / Master module)

Modulart / typ of module:
Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method:

Vorkenntnisse / Previous knowledge:

Examination:
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<td>1 term paper (Hausarbeit) or 1 written exam (Klausur) or 1 oral exam (mündliche Prüfung) or 1 Portfolio</td>
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Course type:
Lecture

SWS:
4

Frequency:

Workload attendance:
56 h
**wir843 - Financial Risk Management**

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<td>• Master Applied Economics and Data Science (Master) &gt; Specialization</td>
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<td>Prokop, Jörg (Module responsibility)</td>
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<td>Skills to be acquired in this module</td>
<td>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</td>
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<td>• 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;</td>
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<tr>
<td></td>
<td>• will be able to devise hedging strategies, arbitrage strategies, and speculative strategies using financial derivatives such as futures contracts, forward contracts, options, and swaps;</td>
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<td></td>
<td>• will be able to consistently apply valuation models to determine theoretical prices of financial derivatives.</td>
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<tr>
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<td>• will be able to assess limitations of financial derivatives in risk management.</td>
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<td>Module contents</td>
<td>The course provides insights into the theory and practice of modern financial business risk management, including:</td>
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<td>• the concept of risk, types of financial risks, and approaches to risk measurement;</td>
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<tr>
<td></td>
<td>• the mechanics of financial markets, including derivatives markets;</td>
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<tr>
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<td>• the properties of selected financial instruments, including financial derivatives such as forwards, futures, options, and swaps;</td>
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<td>• tools and techniques for managing financial risks.</td>
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<td>Reader's advisory</td>
<td>Highly recommended readings:</td>
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<tr>
<td></td>
<td>• John C. Hull, Options, Futures, And Other Derivatives, current edition, Pearson.</td>
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<td>Optional readings:</td>
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wir886 - Digital Transformation: Strategies and Sustainability

Module label | Digital Transformation: Strategies and Sustainability
Module code | wir886
Credit points | 6.0 KP
Workload | 180 h
Workload | 4 SWS (56h)

Applicability of the module
- Master Applied Economics and Data Science (Master) > Specialization
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Nachhaltigkeitsmanagement" (NM)
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Unternehmensführung"
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

Responsible persons
Lehrenden, Die im Modul (Authorized examiners)
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 digitization.

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.

Reader's advisory

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.
Modullevel / module level | EB (Ergänzungsbereich / Complementary)
Modulart / typ of module | Wahlpflicht / Elective
Lehr-/Lernform / Teaching/Learning method | 1 VL und 1 Übung
### Vorkenntnisse / Previous knowledge

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<td>SoSe oder WiSe</td>
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**Total time of attendance for the module**

56 h
wir896 - Operations Management

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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 Administration, Economics and Law (Master) > Schwerpunkt “Unternehmensführung”

**Responsible persons**
- Busse, Christian (Module responsibility)
- Lehrenden, Die im Modul (Authorized examiners)

**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

**Reader's advisory**


**Links**

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

**Language of instruction**

English

**Duration (semesters)**

1 Semester

**Module frequency**

jährlich

**Module capacity**

unlimited

**Module level / module level**

MM (Mastermodul / Master module)

**Moduleart / typ of module**

Wahlpflicht / Elective

**Lehr-/Lernform / Teaching/Learning method**

**Vorkenntnisse / Previous knowledge**

**Examination**

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<th>Time of examination</th>
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**Course type**

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**Workload of compulsory attendance**

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**Total time of attendance for the module**

56 h
### wir898 - Strategic Sustainability Management

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| Workload of compulsory attendance | 28 |
| Frequency | SoSe oder WiSe |
| Total time of attendance for the module | 56 h |
wir899 - Supply Chain Management

Module label: Supply Chain Management
Module code: 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, Economics and Law (Master) > Schwerpunkt "Unternehmensführung"

Responsible persons:
- Busse, Christian (Module responsibility)
- Lehrenden, Die im Modul (Authorized examiners)

Prerequisites:

Skills to be acquired in this module:
In der zum Modul gehörenden 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

Reader's advisory:

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

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Modulelevel / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method:

Vorkenntnisse / Previous knowledge:

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

Final exam of module:
Course type: Lecture
Comment: 2
SWS: 28
Frequency: SoSe oder WiSe
Workload of compulsory attendance: 28
Course type: Seminar
Comment: 2
SWS: 28
Frequency: SoSe oder WiSe
Workload of compulsory attendance: 28

Total time of attendance for the module: 56 h
wir921 - Sustainable Supply Chain Management

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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 Administration, Economics and Law (Master) > Schwerpunkt  
                                  | "Nachhaltigkeitsmanagement" (NM)  
                                  | Master's Programme Sustainability Economics and Management (Master) > Akzentmodule |
| Responsible persons              | Busse, Christian (Module responsibility)                 |
|                                 | Lehrenden, Die im Modul (Authorized examiners)            |
|                                 | Busse, Christian (Module counselling)                     |
| Prerequisites                    |                                                          |
| Skills to be acquired in this module | 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 accentuate them to the intricacies of scientific writing. |
| Module contents                  |                                                          |
|                                 | 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:  
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 & Lean and Green; Workplace Health and Safety; Sustainable Transportation; Sustainable Warehousing & Sustainable Packaging; and Closed-Loop Supply Chain Management  
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 & Greenwashing; Supply Chain Sustainability Risks; Sustainable Supplier Management; and Supply Chain Sustainability Dilemmas  
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. |
<p>| Reader's advisory                | 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. |
| Links                            |                                                          |
| Language of instruction          | English                                                  |
| Duration (semesters)             | 1 Semester                                               |
| Module frequency                 | Yearly in the summer term                                |
| Module capacity                  | unlimited                                                |
| Reference text                   | 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 available via Stud.IP before the beginning of the course. |
| Modullevel / module level        | MM (Mastermodul / Master module)                         |
| Modulart / typ of module         | Wahlpflicht / Elective                                    |
| Lehr-/Lernform / Teaching/Learning method | Lectures and seminar sessions will be completely intertwined |
| Vorkenntnisse / Previous knowledge | There are no formal or informal prerequisites. Basic knowledge of business and management, corporate sustainability, and supply chain and operations management is advantageous. Familiarity with management theories and research methods will also help students. |
| Examination                      |                                                          |
| Time of examination              |                                                          |
| Type of examination              |                                                          |
| Final exam of module             |                                                          |
| Time of examination              |                                                          |
| Type of examination              | Portfolio                                                |</p>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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**Total time of attendance for the module** 56 h
**wir806 - Information Technology Law**

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<td>Workload</td>
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**Applicability of the module**
- Bachelor's Programme Business Informatics (Bachelor) > Wahlbereich Informatik, Kultur und Gesellschaft
- Master Applied Economics and Data Science (Master) > Specialization
- Master of Education Programme (Gymnasium) Computing Science (Master of Education) > Mastermodule
- Master of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Recht und Gesellschaft
- Master's Programme Business Administration, Economics and Law (Master) > Mantelmodule
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Recht der Wirtschaft" (RdW)
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)
- Master's Programme Computing Science (Master) > Nicht Informatik

**Responsible persons**
Lehrenden, Die im Modul (Authorized examiners)

Louven, Sebastian (Module counselling)

**Prerequisites**

**Skills to be acquired in this module**
Upon completion of the module, students will be able to:
- deal with all legal questions arising from the use of information and communication technology in all sectors of society,
- identify legal issues arising from the use of information and communication technology,
- draft solutions for these legal questions.

**Module contents**
Internet law; IT contracts law

**Reader's advisory**
Köhler, Fetzer, Recht des Internet, 8. Aufl., 2016
Redeker, IT-Recht, 6. Aufl., 2017

**Links**

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**
jährlich

**Module capacity**
unlimited

**Modulart / typ of module**
je nach Studiengang Pflicht oder Wahlpflicht

**Lehr-/Lernform / Teaching/Learning method**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
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<th>Time of examination</th>
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</thead>
<tbody>
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<td>during term</td>
<td>presentation and handout, written exam or oral exam</td>
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**Course type**

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**Workload of compulsory attendance**

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**Total time of attendance for the module**
56 h
Data Science

inf501 - Environmental Information Systems

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**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 Environmental Modelling (Master) > Mastermodule
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules

**Responsible persons**
Vogel-Sonnenschein, Ute (Module responsibility)

Lehrenden, Die im Modul (Authorized examiners)
Vogel-Sonnenschein, Ute (Authorized examiners)

**Prerequisites**

**Skills to be acquired in this module**
The module gives an overview of the phases and important aspects of the environmental information processing. **Professional competence** The students: - apply basic processing algorithms to classify and process data - compare, evaluate and design data structures to store spatial data efficiently - apply basic functions of a geo-information system - describe, evaluate and apply basic processes of data mining - describe, evaluate and apply basic geostatistics processes - evaluate and apply multicriteria decision making processes **Methodological competence** The students: - use geoinformation systems for environmental application - use data mining tools for data analysis **Social competence** The students: - present and discuss their solutions in class **Self-competence** The students: - reflect their own behaviour with regard to the methods of environmental informatics

**Module contents**
Content of the Module: Environmental information systems make information about the general environmental state available for public management and public facilities, enterprises or interested citizens. The collection, storage and evaluation of this information is interesting for computer science. Within the scope of the lecture we will examine the processing of environmental information step-by-step, this means: - problems of data acquisition and data processing - data structures and database concepts for an efficient access to (usually) spatial data - introduction of data analysis (in particular from geostatistics and data mining) - introduction of multicriteria decision processes, as well as - the supply of data supported by meta data. The module "Umweltinformationssysteme" is accompanied by the module "Modellbildung in Simulation ökologischer Systeme". The subjects of "Modellbildung in Simulation ökologischer Systeme" represent the dynamic aspects of environmental systems (mainly of ecological systems). Nevertheless, the modules can be taken independently from each other.

**Reader's advisory**

**Links**

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**
jährlich

**Module capacity**
unlimited

**Reference text**
Associated with the module: - inf500 Modellbildg. und Sim. ökol. Systeme

**Modullevel / module level**

**Modulart / typ of module**

**Lehr-/Lernform / Teaching/Learning method**

**Vorkenntnisse / Previous knowledge**
- Datenbanken
- Grundlagen der Statistik/Stochastik

**Examination**

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<td>Practical exercises and oral examination or portfolio</td>
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**Course type**

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

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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 Business Informatics (Master) > Akzentsetzungsmodul 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 Environmental Modelling (Master) > Mastermodule

**Responsible persons**
Kramer, Oliver (Authorized examiners)
Lehrenden, Die im Modul (Authorized examiners)

**Prerequisites**

**Skills to be acquired in this module**

**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-modelling

**Reader's advisory**
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<td>- Grundlagen der Statistik</td>
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<td>Time of examination</td>
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<td>At the end of the lecture period</td>
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<td>Course type</td>
<td>Comment</td>
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### inf536 - Computational Intelligence II

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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 Business Informatics (Master) > Akzentsetzungsmodul 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 Environmental Modelling (Master) > Mastermodule

#### Responsible persons
Lehrenden, Die im Modul (Authorized examiners)
Kramer, Oliver (Authorized examiners)

#### Prerequisites

#### Skills to be acquired in this module

**Professional competence**
The students:

- Recognise machine learning problems
- Implement simple algorithms of machine learning
- Critically discuss solutions and selection of methods
- Deepen previous knowledge of analysis and linear algebra

**Methodological competence**
The students:

- Deepen programming skills
- Apply modelling skills
- Learn about the relation between problem class and method selection

**Social competence**
The students:

- Cooperatively implement content introduced in lecture
- Evaluate own solutions and compare them with those of their peers

**Self-competence**
The students:

- Evaluate own skills w.r.t. peers
- Realise personal limitations
- Adapt own problem solving approaches w.r.t. required method competences

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

**Overview of Content:**

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

#### Reader’s advisory
<table>
<thead>
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<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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| Vorkenntnisse / Previous knowledge | - inf535 Computational Intelligence I  
- Statistik |
| Examination | Time of examination | Type of examination |
| Final exam of module | At the end of the semester | Written or oral exam |
| Course type | Comment | SWS | Frequency | Workload of compulsory attendance |
| Lecture | 2 | SuSe | | 28 |
| Exercises | 2 | SuSe | | 28 |
| Total time of attendance for the module | 56 h |
inf604 - Business Intelligence I

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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 of Education Programme (Vocational and Business Education) Computing Science (Master of Education) > Mastermodule
- Master's Programme Business Informatics (Master) > Akzentsetzungsmodul 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 Gomez, Jorge (Authorized examiners)
Lehrrenden, Die im Modul (Authorized examiners)

Prerequisites

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 past 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 primary 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.

Reader's advisory

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

Links

http://www.wi-ol.de

Languages of instruction
German, English

Duration (semesters)
1 Semester

Module frequency
jährlich

Module capacity
unlimited

Modullevel / module level
AS (Akzentsetzung / Accentuation)

Modulant / typ of module
Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method
V + Ü

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination
Final exam of module
At the end of the lecture period
Written exam max. 120 minutes

Course type
Comment
SWS
Frequency
Workload of compulsory attendance
Lecture
2
WiSe
28
Exercises
2
WiSe
28

Total time of attendance for the module
56 h
inf607 - Business Intelligence II

Module label: Business Intelligence II
Module code: inf607
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) > Data Science
- Master's Programme Computing Science (Master) > Data Science
- Master's Programme Engineering of Socio-Technical Systems (Master) > Data Science
- 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 Gomez, Jorge (Authorized examiners)
Lehrenden, Die im Modul (Authorized examiners)

Prerequisites

Skills to be acquired in this module
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.

Professional competence
The students:
- name and recognize the role of data analytics / data science as part of a daily business process in a particular company
- able to organize from management perspective data analytics project
- 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 state of the art approaches and available best practices

Methodological competence
The students:
- being able to execute typical tasks of data analytics, and also being able to proceed deeper with respect to 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

Social competence
The students:
- build solutions based on case studies given to the group, for example design of regression model based on provided dataset
- discuss solutions on a technical level
- present obtained case studies solutions as part of the exercises

Self-competence
The students:
- critically review provided offered information

Module contents
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.

Reader's advisory
- 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  
jährlich

Module capacity  
unlimited

Modullevel / module level  
AS (Akzentsetzung / Accentuation)

Modulart / typ of module  
je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method  
SE nach Ankündigung zu Beginn der Veranstaltung (2 SWS V + 2 SWS Ü oder Blockseminar)

Vorkenntnisse / Previous knowledge  

Final exam of module  
At the end of the lecture period  
Written exam (max. 120 min.)

Course type  
SWS  
Frequency  
Workload of compulsory attendance

| Lecture | 2 | SuSe | 28 |
| Seminar | 2 | SuSe | 28 |

Total time of attendance for the module  
56 h
# inf980 - Introduction to Computer Science for Natural Science Students

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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 Chemistry (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Chemistry (Bachelor) > Säule "Überfachliche Professionalisierung"
- Bachelor's Programme Comparative and European Law (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Comparative and European Law (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 (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
- Bachelor's Programme Physics (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"
- 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 Education (Bachelor) > PP "Medieninformatik für Studierende musisch-künstlerischer Fächer"
Dual-Subject Bachelor's Programme Education (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 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

**Lehrenden, Die im Modul (Authorized examiners)**

Vogel-Sonnenschein, Ute (Module responsibility)

### 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

### Reader's advisory

see literature lists in StudIP

### Links

**Languages of instruction**
German, English

**Duration (semesters)**
1 Semester

**Module frequency**
jeweils im Wintersemester

**Module capacity**
unlimited

**Reference text**

**Modullevel / module level**
PB (Professionalisierungsbereich / Professionalization)

**Modulart / typ of module**
Ergänzung/Professionalisierung

**Lehr-/Lernform / Teaching/Learning method**
1V+ 1Ü

**Vorkenntnisse / Previous knowledge**
Kenntnisse einer Programmiersprache sind nützlich, aber nicht zwingend notwendig. Sie können auch begleitend erworben werden.

### Examination

**Time of examination**
2 weeks after the end of the lecture

**Type of examination**
written or oral exam

### Course type

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<td>Exercises</td>
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### Workload of compulsory attendance

- Lecture: 42 WiSe
- Exercises: 14 WiSe

**Total time of attendance for the module**
56 h
Economics

wir821 - International Trade, Production and Change

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<tr>
<td>Applicability of the module</td>
<td>• kein Abschluss European Studies in Global Perspectives &gt; Society, Economy and Politics</td>
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<td>• Master Applied Economics and Data Science (Master) &gt; Economics</td>
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<td>• Master's Programme Business Administration, Economics and Law (Master) &gt; Schwerpunkt &quot;China - Wirtschaft und Sprache&quot; (CHI) - Kernmodule</td>
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<td>• Master's Programme Business Administration, Economics and Law (Master) &gt; Schwerpunkt &quot;Volkswirtschaftslehre&quot; (VWL)</td>
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<td></td>
<td>• Master's Programme Sustainability Economics and Management (Master) &gt; Additional Modules</td>
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<tr>
<td>Responsible persons</td>
<td>Trautwein, Hans-Michael (Module responsibility)</td>
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<tr>
<td>Prerequisites</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>• Understanding of trade relations, international factor movements and corresponding balance-of-payments mechanisms.</td>
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<tr>
<td></td>
<td>• Capability to discuss structural change in global trade and productions in terms of formal models and case studies.</td>
</tr>
<tr>
<td></td>
<td>• Understanding of the causes and alternative strategies of economic integration in regional blocs.</td>
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<tr>
<td></td>
<td>• Understanding of the causes and alternative strategies of economic transformation in emerging markets.</td>
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<tr>
<td></td>
<td>• Ability to research data and evaluate the literature on specific aspects of international trade, production and structural change.</td>
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<td>• international trade policies and regimes,</td>
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<td>• geographical economics,</td>
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<td>• foreign direct investment,</td>
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<td>• labour migration,</td>
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<td>• fragmentation of production,</td>
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<td>• regulations of international trade and factor movements,</td>
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<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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<td>Lehr-/Lernform / Teaching/Learning method</td>
<td>Vorlesung mit begleitendem Seminar</td>
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<tr>
<td>Examination</td>
<td>Time of examination</td>
<td>Type of examination</td>
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<tr>
<td>Final exam of module</td>
<td>during term</td>
<td>seminar paper and presentation</td>
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| Total time of attendance for the module | 56 h |
wir823 - International Finance and Exchange Rate Economics

Module label
International Finance and Exchange Rate Economics

Module code
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, Economics and Law (Master) > Mantelmodule
  "Accounting, Finance, Taxation" (AFT)
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt
  "Transnational Economics and Law" (TEL)
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt
  "Volkswirtschaftslehre" (VWL)

Responsible persons
Trautwein, Hans-Michael (Module responsibility)
Trautwein, Hans-Michael (Authorized examiners)
Trautwein, Hans-Michael (Module counselling)

Prerequisites

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.

Reader's advisory
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.
<table>
<thead>
<tr>
<th>Modullevel / module level</th>
<th>Modulart / typ of module</th>
<th>je nach Studiengang Pflicht oder Wahlpflicht</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>Während der Vorlesungszeit</td>
<td>Referat oder mündliche Prüfung</td>
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<table>
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<tr>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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</tr>
<tr>
<td>Seminar</td>
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Total time of attendance for the module 56 h
### wir873 - Applied Economics

<table>
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<tr>
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<tr>
<td>Module code</td>
<td>wir873</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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</table>
| Applicability of the module | Master Applied Economics and Data Science (Master) > Economics  
|                   | Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Volkswirtschaftslehre" (VWL)  
|                   | Master's Programme Sustainability Economics and Management (Master) > Additional Modules |
| Responsible persons | Bitzer, Jürgen (Module responsibility)  
|                   | Lehrenden, Die im Modul (Authorized examiners) |
| Prerequisites     | 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. |
| Reader's advisory | N/A                         |
| Links             | N/A                         |
| Languages of instruction | German, English |
| Duration (semesters) | 1 Semester             |
| Module frequency  | jährlich               |
| Module capacity   | unlimited              |
| Modullevel / module level | N/A                      |
| Modulart / typ of module | je nach Studiengang Pflicht oder Wahlpflicht |
| Lehr-/Lernform / Teaching/Learning method | N/A |
| Vorkenntnisse / Previous knowledge | N/A |
| Examination       | Time of examination       | Type of examination |
| Final exam of module | vary according to type of examination | term paper or seminar paper and presentation or written exam or oral exam or portfolio or project paper |

<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2</td>
<td></td>
<td>28</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>2</td>
<td></td>
<td>28</td>
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<td>Total time of attendance for the module</td>
<td></td>
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**wir874 - Advanced Microeconomics**

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<tr>
<td>Module code</td>
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<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**
- Master Applied Economics and Data Science (Master) > Economics
- Master's Programme Business Administration, Economics and Law (Master) > Mantelmodule
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "China - Wirtschaft und Sprache" (CHI) - Kernmodule

**Responsible persons**
- Meya, Jasper (Module counselling)
- Helm, Carsten (Module responsibility)
- Lehrenden, Die im Modul (Authorized examiners)

**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;
- Students have a firm knowledge in game theory and contract theory, and can address questions in the context of scientific discussion;
- Students are able to apply methods from game theory and contract theory largely independently to the analysis of situations in which agents interact strategically;
- Students 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.

**Reader’s advisory**

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

**Languages of instruction**
- German, English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

**Modullevel / module level**
- je nach Studiengang Pflicht oder Wahlpflicht

**Lehr-/Lernform / Teaching/Learning method**
- Vorkenntnisse / Previous knowledge

<table>
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<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>At the end of the lecture period. In consultation with the students, the exam can be split in two parts (part 1: mid-term, part 2: end of lecture period)</td>
<td>exam</td>
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</table>

**Course type**
- Course or seminar
- Exercises

<table>
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<th>Comment</th>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Exercises</td>
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**Total time of attendance for the module**
- 56 h
**wir876 - Topics in Economic Research**

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<td>6.0 KP</td>
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<tr>
<td>Workload</td>
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**Applicability of the module**
- Master Applied Economics and Data Science (Master) > Economics
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Volkswirtschaftslehre" (VWL)
- 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 (Authorized examiners)

**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.

**Reader's advisory**

**Links**

**Languages of instruction**

**Duration (semesters)**
1 Semester

**Module frequency**
halbjährlich

**Module capacity**
unlimited

**Modullevel / module level**
je nach Studiengang Pflicht oder Wahlpflicht

**Lehr-/Lernform / Teaching/Learning method**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
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<tr>
<td>will be announced in the first session</td>
<td>term paper or presentation or written exam or oral exam or portfolio.</td>
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**Course type**

<table>
<thead>
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<th>Comment</th>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
<td>Course or seminar (oder Kolloquium)</td>
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<tr>
<td>Exercises</td>
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<td>SoSe und WiSe</td>
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</table>

**Total time of attendance for the module**
56 h
wir878 - Public Economics

Module label: Public Economics
Module code: wir878
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, Economics and Law (Master) > Schwerpunkt "Volkswirtschaftslehre" (VWL)
- Master's Programme Sustainability Economics and Management (Master) > Additional Modules
- Master's Programme Water and Coastal Management (Master) > Socioeconomics

Responsible persons:
Helm, Carsten (Module responsibility)
Lehrenden, Die im Modul (Authorized examiners)
Helm, Carsten (Module counselling)

Prerequisites:
none

Skills to be acquired in this module:
The students are able to:
- understand sources of market failures and government failures
- understand taxing and spending activities of governments
- understand the distinction between normative and positive perspectives in the evaluation of government policy
- apply economic methods to current issues in public economics
- present their research result in the form of written papers and oral presentations

Module contents:
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.

Reader's advisory:

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

Languages of instruction:
German, English

Duration (semesters):
1 Semester

Module frequency:
jährlich

Module capacity:
30

Reference text:
The seminar will be conducted as a block seminar

Modulelevel / module level:
Pflicht o. Wahlpflicht / compulsory or optional

Lehr-/Lernform / Teaching/Learning method:
Lecture and seminar

Vorkenntnisse / Previous knowledge:

Examination:
Time of examination: end of semester
Type of examination: seminar paper end presentation

Final exam of module:
Course type: Lecture and seminar
Comment: SWS 2
Frequency: WiSe
Workload of compulsory attendance: 28
<table>
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<tr>
<th>Course type</th>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
<td>Seminar</td>
<td>2</td>
<td></td>
<td>28</td>
<td>56 h</td>
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</table>

**Total time of attendance for the module** 56 h
**wir901 - Environmental Economics**

**Module label**: Environmental Economics  
**Module code**: 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, Economics and Law (Master) > Schwerpunkt "Nachhaltigkeitsmanagement" (NM)  
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Volkswirtschaftslehre" (VWL)  
- Master's Programme Computing Science (Master) > Nicht Informatik  
- Master's Programme Sustainability Economics and Management (Master) > Basic and Accentuation Modules

**Responsible persons**
- Helm, Carsten (Module counselling)  
- Lehrenden, Die im Modul (Authorized examiners)  
- 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.

**Reader's advisory**

**Links**
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: Annually
- Module capacity: unlimited
- Modulart / typ of module: je nach Studiengang Pflicht oder Wahlpflicht
- Lehr-/Lernform / Teaching/Learning method: Vorlesung und Übung / Lecture and exercise

**Vorkenntnisse / Previous knowledge**

**Final exam of module**
- Time of examination: At the end of the lecture period
- Type of examination: Written exam; bonus through solution of exercises

<table>
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<tr>
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<th>Comment</th>
<th>SWS</th>
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<th>Workload of compulsory attendance</th>
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<tr>
<td>Lecture</td>
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<tr>
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<td>56 h</td>
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### wir889 - Applied Environmental Economics

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<td>Master Applied Economics and Data Science (Master) &gt; Economics</td>
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<tr>
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<td>Master's Programme Sustainability Economics and Management (Master) &gt; Akzentmodule</td>
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<tr>
<td>Responsible persons</td>
<td>Lehrenden, Die im Modul (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Huse, Cristian (Module responsibility)</td>
</tr>
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<td></td>
<td>Huse, Cristian (Module counselling)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td></td>
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<tr>
<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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<tr>
<td></td>
<td>Be able to perform and critically evaluate an empirical analysis.</td>
</tr>
<tr>
<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>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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<td>Module capacity</td>
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<td>Modulart / typ of module</td>
<td>Pflicht o. Wahlpflicht / compulsory or optional</td>
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<td>Lecture</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<tr>
<td>Examination</td>
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<td>Type of examination</td>
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<td>SoSe oder WiSe</td>
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<td>Workload attendance</td>
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### wir890 - Climate Economics

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<tr>
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<td>Workload</td>
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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        |                                                        |
| Prerequisites              |                                                        |
| Skills to be acquired in this module |                                                |
| Module contents            |                                                        |
| Reader's advisory          |                                                        |
| Languages of instruction   | German, English                                        |
| Duration (semesters)       | 1 Semester                                             |
| Module frequency           |                                                        |
| Module capacity            | unlimited                                              |
| Modullevel / module level  | MM (Mastermodul / Master module)                        |
| Modulart / typ of module   | Wahlpflicht / Elective                                  |
| Lehr-/Lernform / Teaching/Learning method |                                            |
| Vorkenntnisse / Previous knowledge |                                              |
| Examination                |                                                        |
| Time of examination        |                                                        |
| Type of examination        |                                                        |
| Final exam of module       | 1 Hausarbeit oder  
                            1 Referat oder  
                            1 Klausur oder  
                            1 mündliche Prüfung oder  
                            1 Portfolio oder  
                            1 Projektbericht |
| Course type                |                                                        |
| Comment                    |                                                        |
| SWS                        | Frequency                                              |
| Workload of compulsory attendance |                                |
| Lecture                    | 2                                                      | SoSe oder WiSe | 28 |
| Seminar                    | 2                                                      | SoSe oder WiSe | 28 |
| Total time of attendance for the module |                                            | 56 h           |
wir893 - Development Economics

Module label: Development Economics
Module code: 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 (Authorized examiners)
- Bitzer, Jürgen (Module counselling)

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.

Reader's advisory:

Links:
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Yearly
Module capacity: unlimited
Modullevel / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Pflicht o. Wahlpflicht / compulsory or optional
Lehr-/Lernform / Teaching/Learning method: Lecture and seminar
Vorkenntnisse / Previous knowledge: Econometrics, Economic Growth

Examination:
- Time of examination: At the end of the lecture period
- Type of examination: Portfolio

Final exam of module:
- Course type: Lecture
- Comment: 
- SWS: 2
- Frequency: SoSe oder WiSe
- Workload of compulsory attendance: 28
- Total time of attendance for the module: 28

- Course type: Seminar
- Comment: 
- SWS: 2
- Frequency: SoSe oder WiSe
- Workload of compulsory attendance: 28
- Total time of attendance for the module: 28

Total time of attendance for the module: 56 h
wir895 - Industrial Organization

Module label: Industrial Organization
Module code: wir895
Credit points: 6.0 KP
Workload: 180 h

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

Responsible persons:
- Huse, Cristian (Module responsibility)
- Lehrenden, Die im Modul (Authorized examiners)
- Huse, Cristian (Module counselling)

Prerequisites:
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.

Reader's advisory:

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: 30
Module capacity: 30

Module level / module level:
MM (Mastermodul / Master module)
Modulart / typ of module:
Pflicht o. Wahlpflicht / compulsory or optional

Lehr-/Lernform / Teaching/Learning method:
Lecture and exercise

Vorkenntnisse / Previous knowledge:

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<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
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<td>Portfolio</td>
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Course type: Lecture
SWS: 2
Frequency: SoSe oder WiSe
Workload of compulsory attendance: 28

Course type: Exercises
SWS: 2
Frequency: SoSe oder WiSe
Workload of compulsory attendance: 28

Total time of attendance for the module: 56 h
**wir922 - Topics in Industrial Organization**

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<td>Skills to be acquired in this module</td>
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<td>Module contents</td>
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<td>Reader's advisory</td>
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<td>1 mündliche Prüfung oder</td>
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## Empirical Methods

### wir875 - Forecasting Methods

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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, Economics and Law (Master) > Schwerpunkt "Unternehmensführung"
- Master's Programme Business Administration, Economics and Law (Master) > Schwerpunkt "Volkswirtschaftslehre" (VWL)
- Master's Programme Business Informatics (Master) > Module der Wirtschafts- und Rechtswissenschaften (Master)
- Master's Programme Computing Science (Master) > Nicht Informatik

### Responsible persons

Stecking, Ralf Werner (Module responsibility)

Lehrenden, Die im Modul (Authorized examiners)

### Prerequisites

**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.

### Reader's advisory


Thome, H. (2005): Zeitreihenanalyse, München

### Links

**Language of instruction**

German

**Duration (semesters)**

1 Semester

**Module frequency**

halbjährlich

**Module capacity**

unlimited

**Modullevel / module level**

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| Total time of attendance for the module | 56 h |
Advanced Econometrics

Module code: wir887
Credit points: 6.0 KP
Workload: 180 h

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

Responsible persons:
- Huse, Cristian (Module responsibility)
- Lehrenden, Die im Modul (Authorized examiners)
- 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.

Reader's advisory:
Papers to be assigned in due course

Links:
- Language of instruction: English
- Duration (semesters): 1 Semester

Module frequency:
Module capacity: 30

Module level / module level: MM (Mastermodul / Master module)
Moduleart / typ of module: Pflicht o. Wahlpflicht / compulsory or optional
Lehr-/Lernform / Teaching/Learning method: Lecture and exercise

Vorkenntnisse / Previous knowledge:

Examination:
Time of examination: At the end of the lecture period
Type of examination: Portfolio

Final exam of module:

Course type:
- Lecture:
  - SWS: 2
  - Frequency: SoSe oder WiSe
  - Workload of compulsory attendance: 28
- Seminar:
  - SWS: 2
  - Frequency: SoSe oder WiSe
  - Workload of compulsory attendance: 28

Total time of attendance for the module: 56 h
wir888 - Applied Econometrics Using GIS Techniques

Module label: Applied Econometrics Using GIS Techniques
Module code: 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 (Authorized examiners)

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.

Reader's advisory:

Links:
Languages of instruction: German, English
Duration (semesters): 1 Semester
Module frequency: unlimited
Module level / module level: MM (Mastermodul / Master module)
Modulart / type of module: Wahlpflicht / Elective

Examination:
- Time of examination
- Type of examination
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<th>Type of examination</th>
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<td>Am Ende der Vorlesungszeit</td>
<td>Mündliche Prüfung oder Klausur oder Referat oder Projektbericht</td>
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**Total time of attendance for the module**

56 h
wir891 - Complex Data Analysis

Module label: Complex Data Analysis
Module code: wir891
Credit points: 6.0 KP
Workload: 180 h

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

Responsible persons:
- Stecking, Ralf Werner (Module responsibility)
- Lehrenden, Die im Modul (Authorized examiners)

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

Reader's advisory:
Hastie, T., Tibshirani, R. and Friedman, J. (2001): The Elements of Statistical Learning, New York

Links:

Languages of instruction:
- German, English

Duration (semesters):
1 Semester

Module frequency:

Module capacity:
unlimited

Module level / module level:
MM (Mastermodul / Master module)

Modultyp / typ of module:
je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method:

Vorkenntnisse / Previous knowledge:

Examination:

Time of examination:
Am Ende der Vorlesungszeit
Type of examination:
Klausur oder Mündliche Prüfung oder Hausarbeit oder Referat

Course type / Course type:

SWS / SWS:

Frequency / Frequency:

Workload of compulsory attendance / Workload of compulsory attendance:

Lecture:
2
SoSe oder WiSe
28

Seminar:
2
SoSe oder WiSe
28

Total time of attendance for the module:
56 h
## Computational Economics

**Module label**  
Computational Economics

**Module code**  
wir892

**Credit points**  
6.0 KP

**Workload**  
180 h

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

**Responsible persons**  
Böhringer, Christoph (Module responsibility)  
Lehrenden, Die im Modul (Authorized examiners)

**Prerequisites**  
None

**Skills to be acquired in this module**  
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.

**Module contents**  
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.

**Reader's advisory**  
Tba

**Links**

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**Module level / module level**  
MM (Mastermodul / Master module)

**Modulart / typ of module**  
Pflicht o. Wahlpflicht / compulsory or optional

**Lehr-/Lernform / Teaching/Learning method**  
Lectures and exercises

**Vorkenntnisse / Previous knowledge**  
Microeconomics

**Examination**

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**Course type**  

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**Total time of attendance for the module**  
56 h
## wir894 - Econometrics of Policy Evaluation

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### Applicability of the module
- Master Applied Economics and Data Science (Master) > Empirical Methods
- Master's Programme Business Administration, Economics and Law (Master) > Mentelmodule
- Master's Programme Sustainability Economics and Management (Master) > Basic and Accentuation Modules

### Responsible persons
- Huse, Cristian (Module responsibility)
- Abel, Dietmar (Authorized examiners)
- 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.

### Reader's advisory

### Links
- English

### Duration (semesters)
- 1 Semester

### Module frequency
- MM (Mastermodul / Master module)

### Modulart / typ of module
- Pflicht o. Wahlpflicht / compulsory or optional

### Lehr-/Lernform / Teaching/Learning method
- Lecture

### Vorkenntnisse / Previous knowledge

### Examination
<table>
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### Course type
- Lecture

### SWS
- 4

### Frequency
- SoSe oder WiSe

### Workload attendance
- 56 h
wir897 - Spatial Econometrics

Module label: Spatial Econometrics  
Module code: wir897  
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 (Authorized examiners)

Prerequisites  
None

Skills to be acquired in this module  
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.

Reader's advisory  

Links  
- Language of instruction: English  
- Duration (semesters): 1 Semester  
- Module frequency: jährlich  
- Module capacity: unlimited  
- Module level / module level: MM (Mastermodul / Master module)  
- Modulart / typ of module: Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge  

Examination  
Time of examination: Am Ende der Vorlesungszeit  
Type of examination: Mündliche Prüfung oder Klausur oder Referat oder Projektbericht

Course type  
- Lecture: 2 SWS, SoSe oder WiSe, 28  
- Seminar: 2 SWS, SoSe oder WiSe, 28

Total time of attendance for the module: 56 h
**Masterabschlussmodul**

*mam - Master’s Degree Module*

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