# 2023/24

Please note the year of validity of the module catalogue.

FACULTY OF MANAGEMENT, ECONOMICS AND SOCIAL SCIENCES

UNIVERSITY OF COLOGNE

VICE DEAN OF STUDIES DEPARTMENT

valid for students of the

Examination Regulations 2015

(enrolment for winter semester 2020/21 at the latest)

# MODULE CATALOGUE

## INFORMATION SYSTEMS

## BACHELOR OF SCIENCE

IN ACCORDANCE WITH THE EXAMINATION REGULATIONS FOR THE SINGLE MAJOR BACHELOR PROGRAMME IN INFORMATION SYSTEMS

| | |
|---|---|
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| **Status** | Taking effect on 01.10.2023 |

# Lists of abbreviations

| | | | |
|---|---|---|---|
| AM | Advanced module | PR | Project |
| AS | Assignment | PRES | Presentation |
| C | Course | SI | Studium Integrale |
| CC | Compulsory course | SM | Specialisation module |
| CM | Core module | SPM | Supplementary module |
| CH | Contact hours ( = time spent in class) | SPW | Semester period per week |
| ECTS | Credit Points | SSt | Self-study |
| CS | Case study | TP | Term paper |
| EC | Elective course | TPF | Time required for preparation and follow-up |
| OE | Oral Examination | TR | Credit points transferred from another university |
| PRP | Project report | WL | Workload |
| PCR | Practical component report | WT | Written Test |

# Table of Contents

# 1 Information Systems

Information Systems is an independent, interdisciplinary field, which has its roots in informatics and economics, especially business administration.

The Cologne Institute of Information Systems (CIIS) is responsible for teaching Information Systems at the University of Cologne. In addition, the range of courses is supplemented by teaching assignments and practical contributions. There are extra-curricular workshops on current topics (for example App development, Big Data, Soft-Skills) held at irregular intervals, which are mostly financially supported by companies and are sometimes even hosted by them.

## 1.1 Content and objectives of the programme

Graduates have competences at level 6 of the German Qualification Framework or the Bachelor level of the German Qualification Framework for Higher Education Qualifications. Their specific formulation as *Intended Learning Outcome* is:

Graduates…

…understand the logical and theoretical principles of informatics, correctness, calculability and complexity of algorithms.

…know the application, structure and function of information technologies and information systems in organisations and their implications, and/or understand data base management systems and integrated information systems.

…recognise different methods for management, know respective advantages and disadvantages, and apply the development process for information systems.

…analyse corporate decisions relative to application and information systems from an information economics perspective.

…reflect their knowledge in practical situations and use it problem solving oriented.

…apply IT, economic, mathematical and statistical theories and methods to selected issues.

…understand a programming language, and can create and apply application programmes with a given authoring tool.

...apply their knowledge in practical situations or apply the presented methods in practice-relevant tasks, and demonstrate awareness of situational environmental factors (e.g. mid- to long-term economic trends, ethical implications of electronic data processing).

…collect, systematise and define literature and data material for scientific papers/questions on a selected topic.

…prepare independently an academic paper/thesis on a selected topic under the advisor’s guidance.

...work constructively and cooperatively in teams.

…present and/or discuss academic topics and problems in German or in English.

…justify argumentatively and evaluate independently positions, solutions to problems or processes in German or in English.
…consider during the preparation for solution of problems perspectives of relevant stakeholders.
…organise independently their own work and learning processes.
…evaluate their own action processes by self- and external-reflexion.

The subject of information systems deals with the conception, development and application of information systems in economics, management and increasingly in our private life. The subject unites theoretical knowledge of several disciplines with application-oriented focus towards system solutions for operational challenges. In many contexts of work and living environment, it provides solutions to product and (business) process designing under economic framework conditions, with its innovative capacity. Information systems are indispensable in almost all conceivable economic, political and social contexts like resource management, energy, security, health and care, traffic, environment, production, finance, education, production as well as media. Information systems contribute towards decision-making, coordination, steering and control of value added processes as well as their automation, integration and virtualisation. Information systems can affect product, process and business model innovations. Therefore, a degree course in business informatics opens up a wide operational spectrum for the interface of business management and informatics, especially in planning, development, introduction and operation of information systems. In the labour market, the frequently sought-after dual qualification in the areas of business administration and informatics can be applied in a wide spectrum of various business areas and industries. Here, IT business engineers adopt a translation function between business administration related world of ideas and voice on one hand and of a technically entrenched system world on the other. IT business engineers can accordingly perceive coordinating functions between IT specialists and subject specialists on the application side, whereby consultancy services and project management are paramount. Over and above that, IT business engineers are experts in structuring and modelling information systems and understand how to make a difference in IT non-expert domains, like healthcare. From an industry-related perspective, not only companies related to information technology like IT service providers or consultancies are considered employers, but in connection with corresponding specialisations like employers from the trade, logistics/transport, media, telecommunication or banking and insurance sectors also.

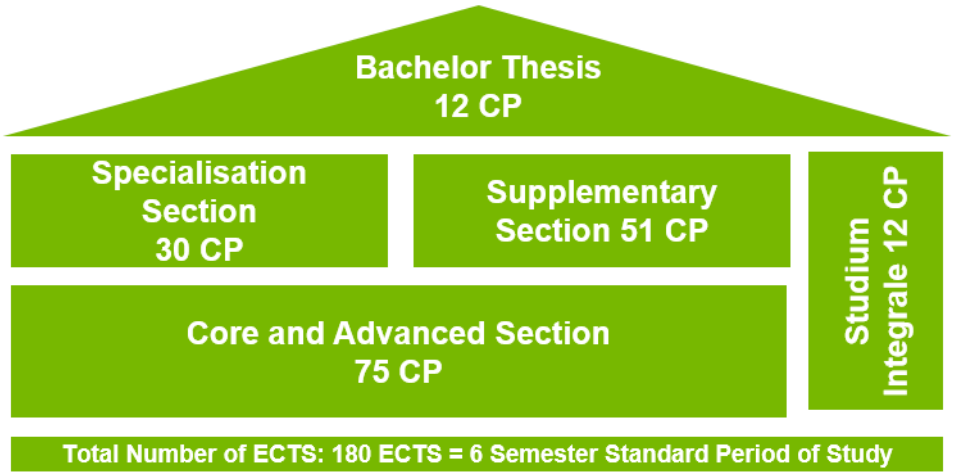
### 1.2 Requirements

Students must bring along the following professional, methodical and personal strengths and inclinations for a successful bachelor's degree:

- Good mathematical and analytical skills
- Abstract and conceptual thinking
- Good linguistic expressiveness in German and English
- Independent, target and result-oriented work
- Marked interest in economic and information technology issues

### 1.3 Programme structure and sequence

The degree course comprises overall 180 CP and includes a Core and Advanced Section (75 CP), a Supplementary Section (51 CP), as well as a Specialisation Section (30 CP). The Core and Advanced Section is again divided into a WiSo Core Section, Mathematics, Informatics and Business Informatics Section. It only includes Fundamental, or rather, Compulsory Modules and should be completed first for this specific reason. The Supplementary Section offers students the chance to obtain knowledge in the areas of Business Administration, Business Informatics or Informatics. Moreover, 12 CP from the wider range of Studium Integrale must be completed. Finally, in the Specialisation Section, additional knowledge from Informatics as well as Business Informatics must be deepened and applied. The degree course ends with a bachelor thesis (12 P).



## 1.4 Study Abroad Option

The WiSo Faculty offers a broad range of study abroad options within an excellent network of prestigious partner universities worldwide. The so-called Study Abroad Programme (STAP) includes ERASMUS exchanges and provides an opportunity for a single-term stay at one of the WiSo Faculty's partner universities. Successful STAP applicants benefit from direct contact and organisational support at the partner university as well as support in the organisation of the semester abroad by the International Relations Center (ZIB WiSo). Additionally, they are exempt from paying tuition fees there. The range of universities available depends on the bachelor course on which the student is enrolled – the possible options are listed in the WiSo Exchange (WEX) (access through the student's UoC account only), along with detailed information on each university.

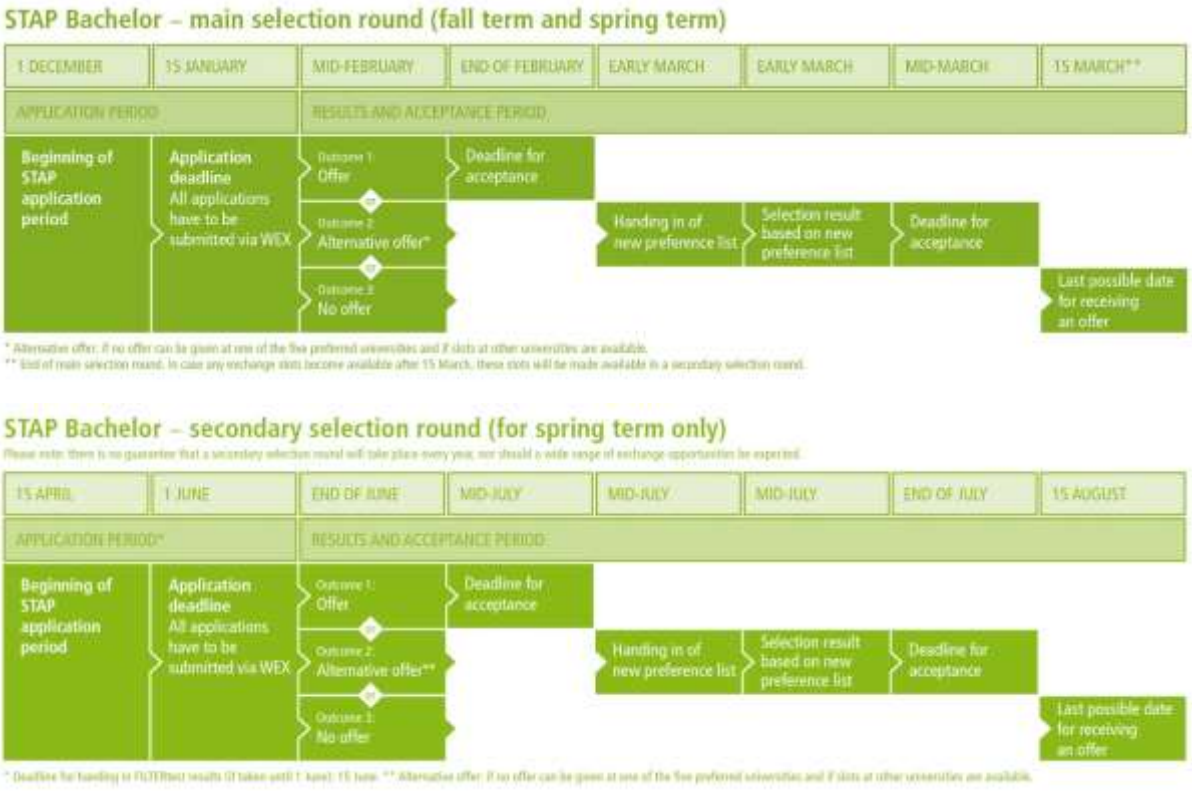
Every year, in addition to the STAP programme, the WiSo Faculty organises an exclusive short-term study option WiSo@NYC which takes place in New York City.

In addition to these options offered by the Faculty, bachelor students can also apply for a non-WiSo exchange, offered by Dezernat 9 – Internationales (Central International Office of the University of Cologne) within the 'fakultätsübergreifende Partnerschaften' framework. Further possibilities are going abroad as a freemover (i.e. as a student who organises his or her stay abroad individually) or participating in short courses or summer schools offered under separate terms and conditions.

### 1.4.1 The Faculty's Study Abroad Programme (STAP)

Bachelor students should plan their application for a term abroad at the beginning of their bachelor studies. The main selection round for STAP takes place once a year, ending on 15th January. It allows for an application either for fall term or spring term of the following academic year. Detailed information on the selection criteria and the best preparation for a STAP application can be found online.

If there are still places available after the main selection round has been completed, another small secondary selection round will be offered between April and June 1st. In this round, students can only apply for the following spring term.




### 1.4.2 Credit transfer options from studies abroad

The WiSo Faculty has put a lot of emphasis on internationalisation in the design of its bachelor programmes, offering broad credit transfer options for all kinds of study abroad options. Each bachelor course includes at least one "Studies Abroad" module, with a broad range of courses suitable for credit transfer. In addition, a single course-to-course credit transfer can be considered. Moreover, students have the option of crediting courses from the semester abroad as part of their Studium Integrale.

For any questions regarding credit transfer, students can contact the ZIB WiSo or the WiSo Credit Transfer Center.

## 1.5 Module study plan sequence

| B.Sc. Information Systems (start winter term) | | | | |
|---|---|---|---|---|
| **Term** | **CC/ EC** | **Module** | **Section** | **CP** |
| 1 | CC | Core Module Mathematics | Core and Advanced Section | 12 |
| 1 | CC | Core Module Computer Science | Core and Advanced Section | 6 |
| 1 | CC | Core Module Information Systems I | Core and Advanced Section | 6 |
| 1 | CC | Core Module Information Systems II | Core and Advanced Section | 6 |
| | | | | 30 |
| 2 | CC | Advanced Module Computer Science I | Core and Advanced Section | 9 |
| 2 | CC | Core Module Fundamentals of Business Administration | Core and Advanced Section | 12 |
| 2 | CC | Advanced Module Information Systems | Core and Advanced Section | 9 |
| | | | | 30 |
| 3 | CC | Advanced Module Computer Science II | Core and Advanced Section | 9 |
| 3 | CC | AM Statistics and Ecoometrics | Core and Advanced Section | 6 |
| 3 | EC | Supplementary Section Business Administration I | Supplementary Section | 9 |
| 3 | CC | Supplementary Module Information Systems I | Supplementary Section | 6 |
| | | | | 30 |
| 4 | EC | Supplementary Section Business Administration II | Supplementary Section | 12 |
| 4 | CC | Supplementary Module Information Systems II | Supplementary Section | 6 |
| 4 | CC | Programming Project | Specialisation Section | 9 |
| 4 | EC | Studium Integrale | Studium Integrale | 6 |
| | | | | 33 |
| 5 | CC | Bachelor Seminar | Specialisation Section | 6 |
| 5 | CC | Specialisation Module Information Systems | Specialisation Section | 15 |
| 5 | EC | Supplementary Module Computer Science | Supplementary Section | 9 |
| | | | | 30 |
| 6 | EC | Supplementary Module Computer Science | Supplementary Section | 9 |
| 6 | EC | Studium Integrale | Studium Integrale | 6 |
| 6 | CC | Bachelor Thesis | Specialisation Section | 12 |
| | | | | 27 |

Note: For the Supplementary Modules in Business Administration, it is possible that the modules include mid-term examinations. Further information regarding mid-terms can be found in section 1.6 Modules with mid-term Examinations.

### 1.5.1 Study plans including a semester abroad

#### a) Adaption

The fifth semester is mostly suitable for studying abroad.
In view of the model study plan sequence and the credit transfer options in the Supplementary Section (12 CP) as well as in the Studium Integrale (12 CP) the two parts of the Studium Integrale as well as the Supplementary Module Business Administration II should be positioned in the fifth semester in the case of an **exemplary** stay abroad. The Specialisation Module Information Systems can be positioned in the sixth semester and both Supplementary Modules Computer Science can be moved to the fourth semester. The Bachelor's Seminar is to be planned according to the individual curriculum.

#### b) General remarks

For questions about studying abroad the ZIB WiSo is at your disposal.
Additionally, it is always possible not to request a semester on leave (*Urlaubssemester*) if you spend a semester abroad such that examinations can be taken upon return to the University of Cologne (if it is individually feasible).

### 1.6 Modules with mid-term examinations

Some modules have courses that only run for half a term and usually with twice the normal number of classes. For these modules, the term is divided into two roughly equal halves. In the fall, the mid-term usually ends at the beginning of December; in the spring, it is usually in the middle or at the end of May. Often, the examinations for these courses are held mid-term, enabling students to reduce their examination load at the end of term.
The information in the campus management system (KLIPS) regarding the dates of courses and examinations is relevant in this context.

### 1.7 Calculation of the overall mark

The overall mark for the bachelor degree combines the marks for the various sub-categories, Core and Advanced Section, Supplementary Section and Specialisation Section, weighted based on the respective number of credit points attainable and each sub-category's contribution towards the overall mark for the examinations for which marks are given. The marks for the sub-categories are calculated as the mean of the examination results in line with the weighting for each examination in terms of the credit points it contributes to the overall mark for the examinations in the respective category for which marks are given. If the result of

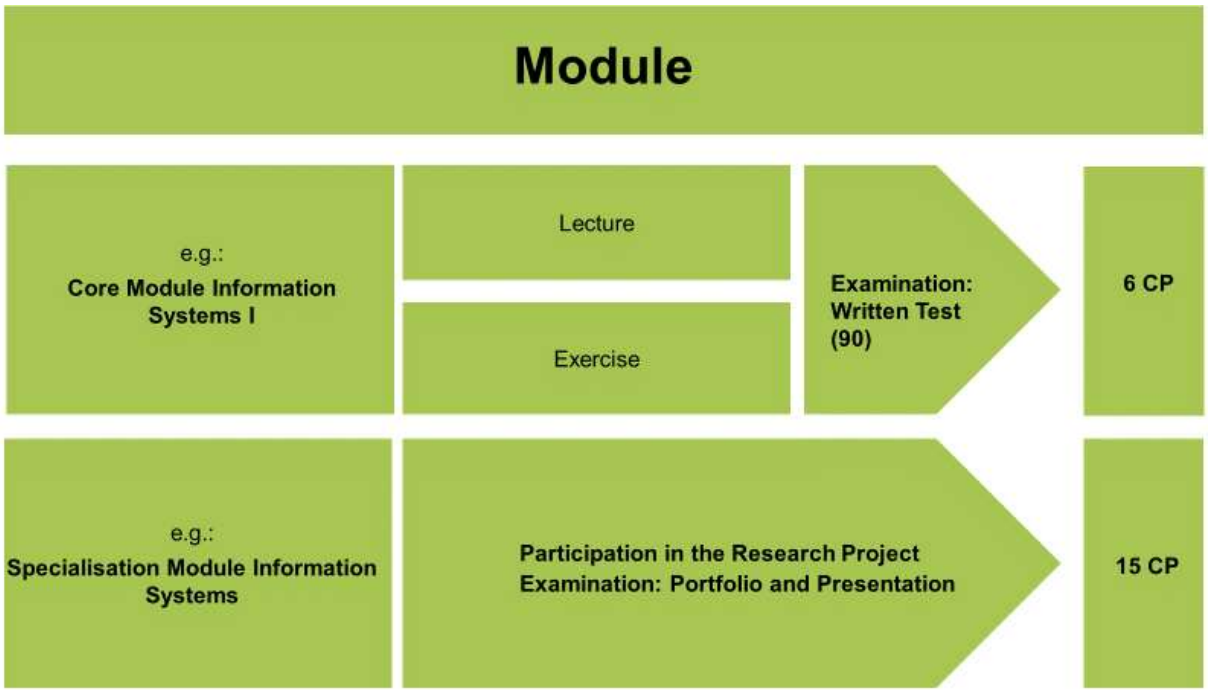
a module examination is calculated based on several components, the mark is calculated based on a weighting given in the module description. For means, only the first decimal place after the decimal point is taken into account; all other decimal places are deleted without rounding.

### 1.8 Modularity

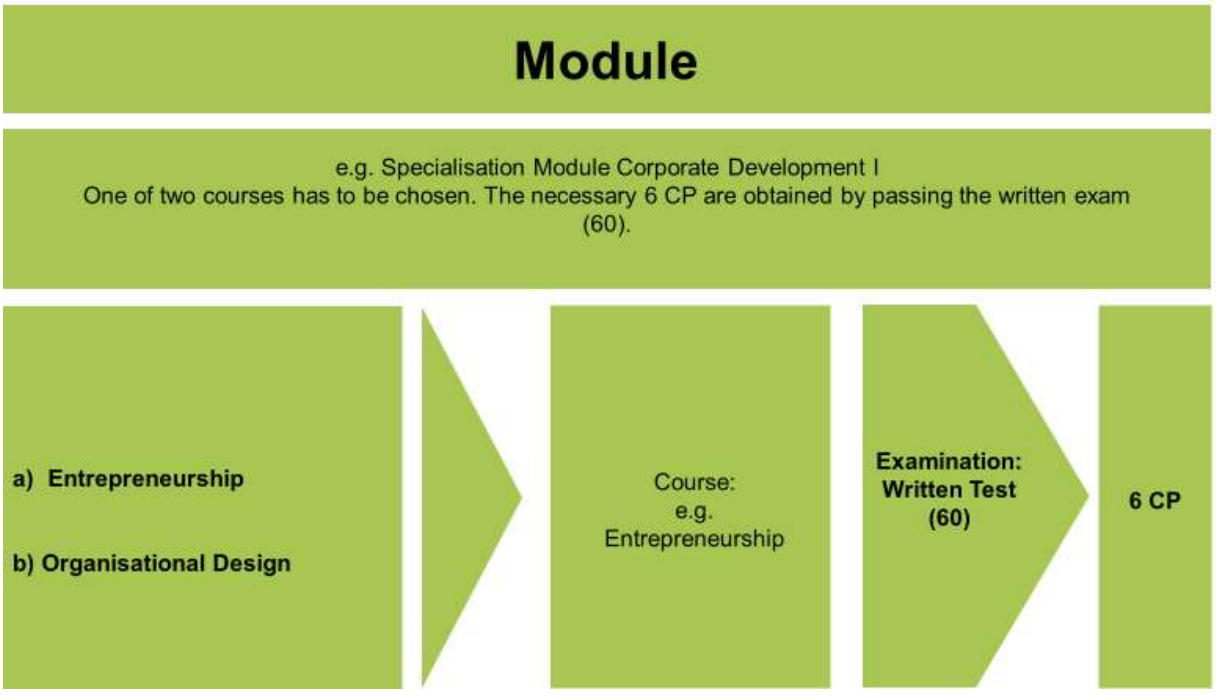
The subject categories on the bachelor programmes are divided into modules, the contents of which are presented in the module descriptions. The bachelor module catalogue can be viewed in the download section of the WiSo Student Services (“WiSo-Studienberatungszentrum”) website. Students who pass the necessary examinations are awarded credit points as proof of their successful participation in a module. The module examinations are taken at regular intervals during the programme. Each module consists of various parts and can usually be completed in one or two terms. You will find this information in the “Duration” section of the module description. A module can consist of lectures, exercises and/or tutorials on the same subject. There are also modules that only comprise one type of class, e.g. a seminar. In some cases, modules offer students a choice between various courses and they are required to take one or more of them. In these cases, the examination can consist of two components (written test in course 1 and a term paper in course 2) or take the form of one, combined examination (a written test covering the content of courses 1 and 2).

When planning your studies, please remember that not every module is offered every term. To find out whether a module is being offered, refer to the “Module availability” section of the module description.

The following examples are to be understood exclusively as illustrations of the individual scenarios; they do not necessarily include modules of the present study programme.




Scenario 1: The module consists of complementary courses on the same subject.




Scenario 2: Students have to chose one course from a selection and take the exam.

### 1.9 Rules for failed attempts

Students may retake module examinations that they have failed. The number of attempts is limited to three per module.

In addition, additional three resit attempts can be granted to students at any point of the programme. Students who have accumulated at least 140 credit points are granted a further additional attempt. If a student fails an examination in the three additional attempts and the extra attempt for students with 140 points or more, they are deemed to have failed the programme at the final attempt. However, students may only be eligible for additional attempts beyond the initial three attempts if none of the first three examination attempts were failed due to cheating or to an offence. If the candidate fails a module examination three times, he or she will receive a written notification informing him or her of the options available. We recommend all students who fail the initial three attempts to seek advice from WiSo Student Services ("WiSo-Studienberatungszentrum") before embarking upon an additional attempt.

Where a module examination consists of several components, the candidate must obtain a "bestanden" (pass) mark, or at least an "ausreichend (4,0)" (sufficient) mark, in all of the examination components. All components marked "mangelhaft (5,0)" or "nicht bestanden" (fail) must be retaken.

It is not possible to retake module examinations that have already been passed.

A failed bachelor thesis can be retaken once, with a new topic. Students must register for their second attempt within six months of the result of their first attempt being announced.

# 2 Support for students

## 2.1 Course registration in KLIPS 2.0

KLIPS 2.0 is the central campus management system of the University of Cologne. At the WiSo faculty, KLIPS 2.0 serves as a student organization tool. Students should use it as an online course catalogue, for registration and deregistration of courses and examinations, as well as an overview of the complete study programme and calendar. Information on current dates and deadlines of the WiSo faculty, as well as video tutorials and FAQs about KLIPS can be found on the homepage of WiSo-KLIPS-Support. If you have further questions, feel free to contact WiSo-KLIPS-Support via e-mail (klips-wiso@uni-koeln.de). For account questions, contact the central KLIPS support.

## 2.2 Exam registration in KLIPS 2.0

Examinations on the various programmes are always managed via KLIPS 2.0. Students must register for them within specified deadlines. Please note that registration for courses without restriction on participation via KLIPS and registration for the corresponding module examinations are two completely separate processes. In the case of courses which are subject to a restriction on participation, an examination registration is generally only possible if a registration for the course has been submitted beforehand. Most examinations in written test form are offered twice per term. Often, this will be to “space out” the dates, i.e. students can choose the date that best fits their examination schedule. In some cases, however, the second examination may be a genuine repetition of the first, depending on the department/institute concerned.

All WiSo Faculty examination candidates are entitled to see their examination papers after they have been marked. For more information, please visit the WiSo Examination Office website.

## 2.3 Subject-specific and examination advice

General advice for students, especially regarding study options and programme requirements, is available from WiSo Student Services **("WiSo-Studienberatungszentrum")** for all programmes at the WiSo Faculty. The WiSo Student Services also offer subject-specific recommendations for students' study plans for the first semester plus information on how the individual programmes are structured. The WiSo Student Services are also the first place students should turn to if they have any other questions or problems concerning their studies. The centre can be contacted by telephone, in person or by email. The opening hours and contact data can be found on the corresponding webpage.

**Subject-specific advice** is provided during the designated times by the University's faculty members and associated teaching staff ("akademische Mitarbeiterinnen und Mitarbeiter") involved in the teaching on the programme. The designated times are announced by means of notices in the institutes and on the departments'/institutes' websites.

Legally binding information concerning examinations and examination procedures is provided by the WiSo Faculty Examination Office. It also issues transcripts of records in German and English, ranking certificates and letters of assignment to the appropriate term of the programme. All the necessary information, contact details and opening hours can be found on the corresponding webpage.

## 2.4 Academic Working

To support the academic writing of term and final papers, the University of Cologne offers various courses to practice the process of academic writing by students. These include:

a) Writing advice/consultation

The Kompetenzzentrum Schreiben, the Professional Center, the Kölner Studierendenwerk and the programme SchreibArt offer advice as well as courses related to the issues that arise when writing an academic paper.

b) Literature research

The university library offers various courses especially for researching literature.

c) Text processing and literature administration

The Regionales Rechenzentrum provides courses regarding text processing and literature administration.

Students can register for the courses of the Professional Center and the SchreibArt programme in the **Studium Integrale** under „Kompetenzen für das Studium" (competencies for studies).

There are even more offers made by the WiSo-faculty that can be elected in the Studium Integrale. Hence, these courses can be credited for your studies.

### 2.5 Other sources of information and advice

International students who study at the WiSo Faculty for part of their programme can turn to the International Relations Centre ("Zentrum für Internationale Beziehungen" or "ZIB") for help with any questions they have. Cologne University students preparing to study abroad can also contact the ZIB for support. The Centre also runs a variety of summer schools, short programmes and Business English courses. The services, courses and people to contact can be found on the corresponding webpage.

The Faculty's Credit Transfer Centre ("Zentrum für die Anrechnung auswärtiger Leistungen") is responsible for recognising credits accumulated in other institutions. This applies both to credits students have gained at other higher education institutions in Germany or abroad prior to studying at the WiSo Faculty, and to (advance) transfer of credits that students plan to accumulate abroad or have already accumulated abroad as part of a WiSo Faculty programme. This system eliminates the need to make individual inquiries to departments/institutes and examination offices. Students can find out everything they need to know about the transfer process on the corresponding webpage.

The WiSo Career Service offers advice and support for students from the WiSo Faculty looking for an internship or profession that is right for them. It also helps them as they plan their career and apply for jobs. In addition, the WiSo Career Service organises seminars, presentations and special events in cooperation with employers and external and internal experts. It also works with other partners in the Faculty and the University to support and guide students as they decide on a career path.

The WiSo IT Service runs regular courses dealing with standard software and field-specific programs.

In case of study-related or personal difficulties, the psychosocial counselling ("Psycho-Soziale Beratung") of the Kölner Studierendenwerk can be called upon. In addition to psychological and social counselling, it also offers writing and learning counselling and support for pregnant women and students with children.

As a further offer, there is Nightline Cologne, the listening and information telephone of students for students. It is available to all students at Cologne universities and colleges.

The WiSo student council represents the interests of all students from the WiSo faculty. In addition to advice from fellow students it also provides a variety of useful services for studying at the WiSo faculty. Any information can be found at **wiso-buero.uni-koeln.de** or by directly writing an email to **wiso-buero@uni-koeln.de**.

# 3 Module tables and descriptions

## 3.1 Core and Advanced Section

In accordance with Section 29(1), No. 1 of the Examination Regulations, students must accumulate 75 CPs in the Core and Advanced Section.

| Group | Module | CP | CC/EC | Reqd. CP |
|---|---|---|---|---|
| Computer Science | Core Module Computer Science | 6 | CC | 24 |
| | Advanced Module Computer Science I | 9 | CC | |
| | Advanced Module Computer Science II | 9 | CC | |
| Information Systems | CM Information Systems I | 6 | CC | 21 |
| | CM Information Systems II | 6 | CC | |
| | AM Information Systems | 9 | CC | |
| Management Core | CM Fundamentals of Business Administration | 12 | CC | 12 |
| Mathematics | Core Module Mathematics | 12 | CC | 18 |
| | AM Statistics and Econometrics[1] | 6 | CC | |

[1] The registration for the examination is not possible if the examination for the compulsory module "Advanced Module Statistics" has already been successfully completed.

## 3.2 Supplementary Section

In accordance with Section 29(1), No. 2 of the Examination Regulations, students must accumulate 51 CPs in the supplementary section.

| Group | Module | CP | CC/EC | Reqd. CP |
|---|---|---|---|---|
| Management I | Core Module Corporate Development | 9 | EC | 9 |
| | Core Module Finance | 9 | EC | |
| | Core Module Marketing | 9 | EC | |
| | Core Module Supply Chain Management | 9 | EC | |
| Management II | SpM Corporate Development I[1] | 6 | EC | 12 |
| | SpM Corporate Development II[1] | 6 | EC | |
| | SpM Finance I[2] | 6 | EC | |
| | SpM Finance II[2] | 6 | EC | |
| | SpM Marketing I[3] | 6 | EC | |
| | SpM Marketing II[3] | 6 | EC | |
| | SpM Supply Chain Management I[4] | 6 | EC | |
| | SpM Supply Chain Management II[4] | 6 | EC | |
| | SuM Entrepreneurship | 6 | EC | |
| | Supplementary Module Studies Abroad | 12 | EC | |
| Computer Science | Supplementary Module Theoretical Computer Science | 9 | EC | 18 |
| | Supplementary Module Practical Computer Science | 9 | EC | |
| | Supplementary Module Applied Computer Science | 9 | EC | |
| | Supplementary Module Technical Computer Science | 9 | EC | |
| | Supplementary Module Mathematics I | 9 | EC | |
| | Supplementary Module Mathematics II | 9 | EC | |
| | Supplementary Module Mathematics III | 9 | EC | |
| Information Systems | SuM Information Systems I | 6 | CC | 12 |
| | SuM Information Systems II | 6 | CC | |

[1] Not possible if the examination for "Specialisation module Strategy, Organization and Human Resources" (12 CP) has been successfully completed.
[2] Not possible if the examination for "Specialisation module Finance" (12 CP) has been successfully completed.
[3] Not possible if the examination for "Specialisation module Marketing" (12 CP) has been successfully completed.
[4] Not possible if the examination for "Specialisation module Supply Chain Management (1271SMSC01)" (12 CP) has been successfully completed.

### 3.3 Specialisation Section

In accordance with Section 29(1), No. 3 of the Examination Regulations, students must accumulate 30 CPs in the specialisation section.

| Group | Module | CP | CC/EC | Reqd. CP |
|---|---|---|---|---|
| Specialization Section | Programming Project | 9 | CC | 24 |
| | SpM Information Systems | 15 | CC | |
| Seminar | Bachelor Seminar Information Systems | 6 | CC | 6 |

### 3.4 Studium Integrale

All of the Faculty's bachelor programmes include an interdisciplinary component, known as the Studium Integrale, in which students accumulate 12 credit points. The Studium Integrale is a university-wide and interdisciplinary component of the courses of study in which academic and professional competences are imparted. The Studium Integrale has both theoretical and practical content, enabling students to focus on more academic aspects or topics related to their future careers enhancing their employability. It aims to teach and develop skills that go beyond subject-specific knowledge or that are related to basic academic and personal traits: scientific curiosity, systematic and analytical thinking, and ability to deal with complexity, a solution-minded outlook plus other abilities such as teamwork and foreign language skills.

The Studium Integrale courses are run jointly by the faculties and the University's Professional Centre. They enable students to pursue their own interests in more depth, gain an insight into other subjects and departments, attend courses dealing with issues of relevance to society, acquire skills relevant to their future careers and attend language classes. The "Universitas" segment offers formats especially designed for the Studium Integrale, such as lecture series on societal issues with related workshops. In addition, the Studium Integrale offers students assistance with their learning and studying, helping them with such questions as how to write an academic paper or how to conduct literature reviews. Periods of training abroad and work experience can also be credited in the Studium Integrale. The Studium Integrale carries 12 credit points in total and formally counts as a module. There is no restriction on the number of attempts possible for Studium Integrale examinations.

Any credit points attained in the Studium Integrale over and above the 12 credit points specified in the study structure are shown on the transcript of records.

### 3.5 Bachelor Thesis

The bachelor thesis carries 12 CPs and is written at the end of the programme. Its aim is to illustrate that the candidate is capable of working and reflecting independently on a specific problem related to the subject matter covered on the programme, using the necessary methods and within a specified period. The topic of the bachelor thesis must reflect one of the sub-categories: Core and Advanced Section, Supplementary Section or Specialisation Section.
To be allowed to register for the bachelor thesis component, candidates must have acquired at least 100 credit points. In line with the number of credit points it carries, the workload allotted for the thesis is 360 hours, i.e. 12 weeks. Bachelor theses should not be more than 40 pages long. Candidates who have earned all of the necessary credit points, except for the bachelor thesis, must register within a period of one year to write their bachelor thesis. Further and more detailed information concerning bachelor theses can be found in the examination regulations.
Please note that the Cologne Institute for Information Systems (CIIS) offers Bachelor theses in every semester. Each semester you can start working on your bachelor thesis at **one fixed starting time** (in November in winter semesters and in May in summer semesters).

## 3.6 Module Descriptions

### 3.6.1 Core and Advanced Section

| **Core Module Computer Science** | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>5722BMIn00 | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Programming Course | | **Contact Hours**<br>30h | **Self-Studies**<br>150h | **Course Language**<br>German |
| **2** | **Module Content**<br>The event starts with a general introduction to development tools and environments as well as the Java programming language. he core of the course is the teaching of basic programming skills in the areas of "data types, instructions and control structures", "classes and objects", "object-oriented design and implementation", "Java language class libraries" and "problem analysis and resolution" as well as the design and development of small programs. | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... are able to create, analyze and apply simple Java programs.<br>... can analyze given problems and implement them as Java programs.<br>... can independently explore and use class libraries. | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written Test: WT e (90) | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. If prior notice is given, regular participation in the exercises and successful completion of exercises and/or projects can be used as a prerequisite for admission to the examination and included in the examination performance on a pro rata basis | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Core and Advanced Section | | | | |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät | | | | |
| **10** | **Miscellaneous**<br>Programming cannot be learned exclusively by theoretical observation, therefore the participation in the exercises and the independent processing of implementation tasks is indispensable. Registration is required to take part in the final exam. One retest per cycle is offered. A repeated participation in | | | | |

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| | the lecture and the exercises to prepare for a repetition of the final exam is possible. The module will be graded. The exam will be an e-exam. |

| Advanced Module Computer Science I | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>5722AMIn01 | | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Computer Science I | | | **Contact Hours**<br>90h | **Self-Studies**<br>180h | **Course Language**<br>German |
| **2** | **Module Content**<br>After an introduction to the terminology and definition of computer science and the structure and functionality of computers, the lecture deals with basic contents of algorithms and data structures. The general design and analysis of algorithms are performed using examples from the fields of sorting and search methods as well as elementary graph algorithms. Furthermore, elementary graph algorithms can be treated. The presented elementary data structures include trees, graphs and Union-Find data structures. | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... are able to design and implement basic algorithms and to analyze algorithms with regard to correctness and their runtime behavior depending on the data structures used. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommended: Core Module Computer Science | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. The examination takes the form of a two-hour exam and may include both a theoretical part and a programming part, which must be passed equally. If prior notice is given, regular participation in the exercises and successful completion of exercises can be used as prerequisites for admission to the examination and can be included in the examination performance on a pro rata basis. Registration is required to take part in the final examination. One retest per cycle is offered. A repeated participation in the lecture and the exercises to prepare for a repetition of the final examination is possible. The module will be graded. | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Core and Advanced Section | | | | | |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät | | | | | |
| **10** | **Miscellaneous**<br>The contents of the lecture cannot be learned exclusively by theoretical observation, therefore participation in the exercises and independent processing of the tasks are indispensable. | | | | | |

| Advanced Module Computer Science II | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>5722AMTI02 | | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Theoretical Computer Science | | | **Contact Hours**<br>60h | **Self-Studies**<br>210h | **Course Language** |
| **2** | **Module Content**<br>The module entails an introduction to theoretical computer science. It consists of a short introduction in automation theory and the area of formal language. The focus lies in the results from computability theory and complexity theory. Important areas are, for example, the definition of Turing machines, results of diagonal language and regard the Halting problem, the complexity classes P and NP, polynomial reductions and NP-completeness. | | | | | |
| **3** | **Learning Objectives**<br>Students will learn how computers are used for modelling in theoretical computer science and which limitations exist for different computing methods. Furthermore, students will learn about the limits of computability and efficient computability, and how to evaluate the complexity of algorithmic problems. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: CM Mathematics, BM Computer Science, AM Computer Science I | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written Test: WT (90 120) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. If prior notice is given, regular participation in the exercises and successful completion of exercises and/or projects can be used as a prerequisite for admission to the examination. | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Core and Advanced Section | | | | | |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät | | | | | |
| **10** | **Miscellaneous**<br>The contents of the lecture cannot be learned exclusively through theoretical observation, therefore participation in the exercises and independent work on the tasks is indispensable. | | | | | |

| CM Information Systems I | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>1277BBWIF1 | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Information Systems Management | | **Contact Hours**<br>60h | **Self-Studies**<br>120h | **Course Language**<br>German |
| **2** | **Module Content**<br>• Information systems as a science<br>• Strategic role of information systems<br>• Internal and inter-company business process integration<br>• Electronic commerce and electronic business<br>• Computer supported collaborative work<br>• IT security<br>• Ethical, social and political aspects<br>• Information assets<br>• Business process reengineering<br>• Internet of things | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories in the field of information management.<br>... apply theories in the field of analysis and structuring concepts in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... use methods in pre-structured contexts in a solution-oriented way in the field of analysis and structuring concepts.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... establish and evaluate independently developed positions.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social or ethical criteria.<br>... question and critically reflect on current social developments. | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Core and Advanced Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Supplementary Section | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Detlef Schoder | | | | |

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| **10** | **Miscellaneous**<br>Mandatory accompanying reading: Laudon, K.; Laudon, J.; Schoder, D.: Wirtschaftsinformatik – eine Einführung, Pearson Verlag, 2015. |

## CM Information Systems II

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 1277BBWIF2 | 180h | 6 | German | every 2nd term - winter term | 1 Term |

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|---|---|---|---|---|
| **1** | **Courses**<br>Database Systems | **Contact Hours**<br>60h | **Self-Studies**<br>120h | **Course Language**<br>German |

**2 Module Content**

- Relational model and relational algebra
- Relational query languages (SQL)
- Conceptual data modelling (e.g., Entity Relationship Model)
- Relational database design
- Normalization (1.-3. normal form, BCNF)
- Development process of database systems
- Data organization, data management, data protection and privacy
- Transactions, Concurrency Control, Indices

**3 Learning Objectives**

Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... know and understand basic theories in the field of relational databases and data management.
... apply theories in the field of relational databases and data management in pre-structured contexts (e.g. case studies) in a solution-oriented way.
... use methods in the field of relational databases and data management in pre-structured contexts in a solution-oriented way.
... develop an understanding of the impact of decisions that take into account environmental, economic, social or ethical criteria.

**4 Teaching and Learning Methods**

lecture
tutorial

**5 Module Entry Requirements**

none

**6 Mode of End-Of-Module Examination**

Written test: WT (90)

**7 Prerequisites for Awarding of Credit Points**

Passing the module examination

**8 Other Programmes that Use the Module**

Bachelor of Science Wirtschaftsinformatik:
Core and Advanced Section
Bachelor of Science Betriebswirtschaftslehre:
Supplementary Section

**9 Module Manager**

Univ.-Prof. Dr. Christoph Rosenkranz

**10 Miscellaneous**

Mandatory reading is announced every semester. The written test may be in the form of an e-examination. Tutorials will be offered instead of exercise classes. The lecture will be conducted using a flipped classroom concept (videos and documents will be provided for self-study; repetition, discussion and consolidation will take place face-to-face in class).

| AM Information Systems | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1277BAWIF1 | | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Integrated Information Systems | | | **Contact Hours**<br>60h | **Self-Studies**<br>210h | **Course Language**<br>German |
| **2** | **Module Content**<br>• Integrated information processing<br>• Business Process Management<br>• Business Process Modelling<br>• Intra-organizational application systems (Enterprise Resource Planning (ERP) and Enterprise Systems)<br>• Inter-organisational application systems (Supply Chain Management (SCM) and Customer Relationship Management (CRM))<br>• Service-oriented architectures (SOA), Cloud Computing and Micro-Services<br>• Enterprise Application Integration (EAI) | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories in the field of integrated information systems and business process management.<br>... apply theories in the field of integrated information systems and business process management in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... know and understand common methods in the field of integrated information systems and business process management.<br>... use methods in the field of integrated information systems and business process management in pre-structured contexts in a solution-oriented way.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>tutorial | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: CM Information Systems I, CM Information Systems II | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (90) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Core and Advanced Section | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Christoph Rosenkranz | | | | | |
| **10** | **Miscellaneous**<br>Mandatory texts can be indicated, which must be read before the lecture. The degree of preparation | | | | | |

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| | is checked in the lectures and exercises. Case studies and exercises can be prepared in group work, which must be presented in the plenum by students. The solutions presented will be analysed and discussed. Mandatory reading will be announced each semester. The exam may take the form of an e-examination. Tutorials will be offered instead of practices. |

| CM Fundamentals of Business Administration | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>1230BBGDB1 | **Workload**<br>360h | **ECTS Credits**<br>12 | **Module Language**<br>German | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Fundamentals of Business Administration | | **Contact Hours**<br>90h | **Self-Studies**<br>270h | **Course Language**<br>German |
| **2** | **Module Content**<br>• Management structures and models<br>• Strategy and target systems of companies<br>• Corporate functions and processes and their interrelationships<br>• Analysis and design of service provision, in particular the deployment of personnel<br>• Main features of the operational cost and performance accounting<br>• Main features of the annual accounts<br>• Main features of operational investment and financing decisions | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... analyse market and environment conditions for entrepreneurial action and their influence on corporate decisions.<br>... reflect and justify basic positions and basic standards (competition, freedom, social justice) of companies in a social market economy.<br>... structure corporate actions according to different process categories and differentiate between management, business and support processes.<br>... design individual management processes with the help of procedures and instruments (values, strategy and corporate goals, coordination and motivation, information and control system).<br>... make decisions for the design and optimization of business processes (customer attraction, customer loyalty, brand management, service delivery, service innovation) and use them to shape relationships with sales and procurement markets.<br>... select adequate financial management procedures for various business decisions and apply them in extracts (external accounting, internal controlling, investment and financial accounting).<br>... assess the success of corporate decisions with the help of key performance indicator systems and draw conclusions from them. | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>tutorial | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (90) | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsmathematik:<br>Business and Economics Sciences Bachelor Business Mathematics<br>Bachelor of Arts Regionalstudien China - Volkswirtschaftslehre:<br>Economics Regional Studies China<br>Bachelor of Arts Regionalstudien Lateinamerika - Volkswirtschaft:<br>Economics Regional Studies Latin America, East and Middle Europe<br>Bachelor of Science Wirtschaftsinformatik: | | | | |

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| | Core and Advanced Section<br>Bachelor of Arts Lehramt:<br>Core Section<br>Bachelor of Science Geographie:<br>Business Administration Bachelor Geography<br>Bachelor of Arts Medienwissenschaft:<br>Media Management and Economics<br>Bachelor of Arts Regionalstudien Lateinamerika - Sozialwissenschaften:<br>Social Sciences Regional Studies Latin America, East and Middle Europe<br>Bachelor of Arts Regionalstudien Ost- und Mitteleuropa - Sozialwissenschaften:<br>Social Sciences Regional Studies Latin America, East and Middle Europe<br>Bachelor of Arts Regionalstudien Ost- und Mitteleuropa - Volkswirtschaftslehre:<br>Economics Regional Studies Latin America, East and Middle Europe<br>Bachelor of Science Mathematik:<br>Business and Economics Sciences Mathematics<br>Bachelor of Science Gesundheitsökonomie:<br>Core and Advanced Section<br>Bachelor of Arts Regionalstudien China - Betriebswirtschaftslehre:<br>Business Administration Regional Studies China |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in des Instituts für Berufs-, Wirtschafts- und Sozialpädagogik |
| **10** | **Miscellaneous** |

## Core Module Mathematics

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 5722BMMa00 | 360h | 12 | German | every 2nd term - winter term | 1 Term |

| | | | | |
|---|---|---|---|---|
| **1** | **Courses**<br>Mathematics | **Contact Hours**<br>120h | **Self-Studies**<br>240h | **Course Language**<br>German |

**2 Module Content**

Real and complex numbers, introduction to structures and functions, sequences, series, limit values, basics of differential and integral calculus, sets and representations, groups, bodies, vector spaces, linear spaces and linear representations, bases and dimensions.

**3 Learning Objectives**

Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... gain knowledge of the basic concepts and methods of mathematics, familiarity with the associated techniques and knowledge of the applications.
... gain a deep insight into the methods of abstract mathematical argumentation independent of the substance.
... can translate facts into the abstract language of mathematics and explain abstract terms.
... can recognize the connections and similarities of the different mathematical areas.
... can independently solve mathematical problems and present the solutions in an understandable way for fellow students.

**4 Teaching and Learning Methods**

lecture
practice

**5 Module Entry Requirements**

none

**6 Mode of End-Of-Module Examination**

Written test: WT (180)

**7 Prerequisites for Awarding of Credit Points**

Successful participation in the exercises and passing the written examination.

**8 Other Programmes that Use the Module**

Bachelor of Science Wirtschaftsinformatik:
Core and Advanced Section

**9 Module Manager**

Mathematisches Institut
Mathematisch-Naturwissenschaftliche Fakultät

**10 Miscellaneous**

Mandatory reading is announced every semester.

| AM Statistics and Econometrics | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1314BAMST1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Statistical Inference and Econometrics | | | **Contact Hours**<br>90h | **Self-Studies**<br>90h | **Course Language**<br>German |
| **2** | **Module Content**<br>• Continuation of probability theory from the Core Module<br>• Fundamentals of statistical inference<br>• Fundamentals of econometrics | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... use methods in the area of statistics and econometrics in pre-structured contexts in a solution-oriented way.<br>... systematize and synthesize data.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... design their learning and working processes independently. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: CM Statistics or CM Mathematics (Information Systems) | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (90) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre sozialwissenschaftlicher Richtung:<br>Core and Advanced Section<br>Bachelor of Science Wirtschaftsmathematik:<br>Business and Economics Sciences Bachelor Business Mathematics Economics<br>Bachelor of Science Volkswirtschaftslehre:<br>Core and Advanced Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Core and Advanced Section<br>Bachelor of Science Mathematik:<br>Business and Economics Sciences Mathematics Economics<br>Bachelor of Science Betriebswirtschaftslehre:<br>Core and Advanced Section | | | | | |
| **9** | **Module Manager**<br>Prof. Dr. Rainer Dyckerhoff<br>Dr. Bastian Gribisch | | | | | |
| **10** | **Miscellaneous**<br>In the self-study phase, tutorials are offered. | | | | | |

### 3.6.2 Supplementary Section

| **Core Module Corporate Development** | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1253BMCD01 | | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Corporate Development I (2. Midterm) | | | **Contact Hours**<br>60h | **Self-Studies**<br>210h | **Course Language**<br>German |
| **2** | **Module Content**<br>This course first introduces foundations of Corporate Governance and Corporate Strategy. Building on this, concepts of Organizational Design and Instruments of Human Resource Management are presented and analysed. | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories in the area of corporate governance, business strategy, organizational design and HR-management.<br>... apply theories in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... establish and evaluate independently developed positions.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>tutorial | | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Supplementary Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Arts Lehramt:<br>Core Section<br>Bachelor of Arts Medienwissenschaft:<br>Media Management and Economics<br>Bachelor of Science Betriebswirtschaftslehre:<br>Core and Advanced Section<br>Bachelor of Science Gesundheitsökonomie:<br>Supplementary Section<br>Bachelor of Arts Regionalstudien China - Betriebswirtschaftslehre:<br>Business Administration Regional Studies China | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr.‘ Anne Burmeister | | | | | |

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| | Univ.-Prof. Dr. Matthias Heinz<br>Univ.-Prof. Dr. Bernd Irlenbusch<br>Univ.-Prof. Dr. Dirk Sliwka |
| **10** | **Miscellaneous** |

| Core Module Finance | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1259BMFi01 | | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Investition und Finanzierung | | | **Contact Hours**<br>60h | **Self-Studies**<br>210h | **Course Language**<br>German |
| **2** | **Module Content**<br>Fundamentals of capital budgeting<br>• Fundamental questions related to terminology and decision theory<br>• Capital budgeting under certainty<br>• Prospects of capital budgeting under uncertainty<br>Fundamentals of financing<br>• Internal financing<br>• External financing | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories in the area of finance.<br>... apply theories in the area of finance in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... know and understand common methods in the area of finance.<br>... use methods in the area of finance in pre-structured contexts in a solution-oriented way.<br>... design their learning and working processes independently. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Supplementary Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Arts Lehramt:<br>Core Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Core and Advanced Section<br>Bachelor of Science Gesundheitsökonomie:<br>Supplementary Section<br>Bachelor of Arts Regionalstudien China - Betriebswirtschaftslehre:<br>Business Administration Regional Studies China | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Alexander Kempf | | | | | |

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| | Dr. Alexander Pütz<br>Univ.-Prof. Dr. Heinrich R. Schradin |
| **10** | **Miscellaneous** |

## Core Module Marketing

| **Module Code** | **Workload** | **ECTS Credits** | **Module Language** | **Module Availability** | **Duration** |
|---|---|---|---|---|---|
| 1266BMMa00 | 270h | 9 | German | every term | 1 Term |

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|---|---|---|---|---|
| **1** | **Courses**<br>Einführung ins Marketing (1. Midterm) | **Contact Hours**<br>60h | **Self-Studies**<br>210h | **Course Language**<br>German |

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| **2** | **Module Content**<br>The module covers theories and methods to analyse key marketing decision problems and to develop sound recommendations how to solve these decision problems. To this end, it looks at (i) consumers' responses to marketing activities and the underlying psychological mechanisms (consumer behaviour), (ii) the collection and analysis of data about markets and key stakeholders (e.g., consumers) which serves as the empirical basis for decision-making (market research), (iii) the marketing planning process (strategic marketing decisions), and (iv) marketing mix decisions (e.g., brand/product, price, etc.). |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories of a market-oriented management of businesses.<br>... know and understand common marketing planning methods, including strategic marketing decisions and marketing mix decisions. |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice |
| **5** | **Module Entry Requirements**<br>none |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Supplementary Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Arts Lehramt:<br>Core Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Core and Advanced Section<br>Bachelor of Science Gesundheitsökonomie:<br>Supplementary Section<br>Bachelor of Arts Regionalstudien China - Betriebswirtschaftslehre:<br>Business Administration Regional Studies China |

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| **9** | **Module Manager**<br>Univ.-Prof. Dr. Werner Reinartz<br>Univ.-Prof. Dr.‘ Franziska Völckner |
| **10** | **Miscellaneous** |

## Core Module Supply Chain Management

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 1271BMSC01 | 270h | 9 | German | every term | 1 Term |

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| 1 | **Courses**<br>Operations Management | **Contact Hours**<br>45h | **Self-Studies**<br>225h | **Course Language**<br>German |

**2 Module Content**

- Fundamentals of Operations Management
- Demand Forecasting
- Inventory Management
- Production Planning
- Supply Chain Management
- Location Planning
- Process Design

**3 Learning Objectives**

Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... know and understand basic theories in the area of supply chain management.
... know and understand common methods in the area of supply chain management.
... use methods in the area of supply chain management in pre-structured contexts in a solution-oriented way.
... analyse (current) questions and challenges within the framework of pre-structured contexts.
... present and/or discuss results with teaching staff and other students.
... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria.

**4 Teaching and Learning Methods**

lecture
practice
tutorial

**5 Module Entry Requirements**

none

**6 Mode of End-Of-Module Examination**

Written test: WT (60)

**7 Prerequisites for Awarding of Credit Points**

Passing the written test.

**8 Other Programmes that Use the Module**

Bachelor of Science Volkswirtschaftslehre:
Supplementary Section
Bachelor of Science Wirtschaftsinformatik:
Supplementary Section
Bachelor of Arts Lehramt:
Core Section
Bachelor of Science Betriebswirtschaftslehre:
Core and Advanced Section
Bachelor of Science Gesundheitsökonomie:
Supplementary Section
Bachelor of Arts Regionalstudien China - Betriebswirtschaftslehre:
Business Administration Regional Studies China

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| **9** | **Module Manager**<br>Univ.-Prof. Dr. Ulrich W. Thonemann |
| **10** | **Miscellaneous** |

| SpM Corporate Development I | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1253BSMCD1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Human Resource Management | | | **Contact Hours**<br>60h | **Self-Studies**<br>120h | **Course Language**<br>English |
| **2** | **Module Content**<br>• Strategies on Market Entry, Products, Markets and Value Creation<br>• Entrepreneurial Behaviour<br>• Contingency Theory<br>• Managing Organizational Change<br>• Personnel Management | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories.<br>... apply theories in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... present and/or discuss results with teaching staff and other students.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: Either Core Module Corporate Development, CM Statistics, AM Statistics and Econometrics or CM Digital Transformation and Entrepreneurship, CM Business Ethics, CM Introduction to Statistics, CM Data Analysis and Econometrics | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of course a) or b) | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr.‘ Anne Burmeister<br>Univ.-Prof. Dr. Matthias Heinz<br>Univ.-Prof. Dr. Bernd Irlenbusch<br>Univ.-Prof. Dr. Dirk Sliwka | | | | | |

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| **10** | **Miscellaneous** |

| SpM Corporate Development II | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1253BSMCD2 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>a) Organizational Behavior (Bachelor)<br>b) International Strategic Management | | | **Contact Hours**<br>a) 60h<br>b) 30h | **Self-Studies**<br>a) 120h<br>b) 150h | **Course Language**<br>a) English<br>b) English |
| **2** | **Module Content**<br>• Theories of International Management<br>• Employee Participation and Corporate Governance<br>• Equality and Diversity | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... communicate in English.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria.<br>... question and critically reflect on current social developments. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: Either Core Module Corporate Development, CM Statistics, AM Statistics and Econometrics or CM Digital Transformation and Entrepreneurship, CM Business Ethics, CM Introduction to Statistics, CM Data Analysis and Econometrics | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination for course a) or b). | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr.‘ Anne Burmeister<br>Univ.-Prof. Dr. Matthias Heinz<br>Univ.-Prof. Dr. Bernd Irlenbusch<br>Univ.-Prof. Dr. Dirk Sliwka | | | | | |
| **10** | **Miscellaneous** | | | | | |

| SpM Finance I | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1259BSMFI1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>a) Corporate Finance<br>b) Investment Management | | | **Contact Hours**<br>a) 60h<br>b) 60h | **Self-Studies**<br>a) 120h<br>b) 120h | **Course Language**<br>a) English<br>b) German |
| **2** | **Module Content**<br>a) Corporate Finance<br>• Analysing and Working with Financial Statements<br>• Company Valuation<br>• Mergers & Acquisitions<br><br>b) Investment Management<br>• Portfolio theory<br>• Risk management<br>• Investment strategies | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... apply theories in the area of Finance in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... use methods in the area of Finance in pre-structured contexts in a solution-oriented way.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... establish and evaluate independently developed positions.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria.<br>... question and critically reflect on current developments at the capital market. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of course a) or b) | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section | | | | | |

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| **9** | **Module Manager**<br>Univ.-Prof. Dr. Dieter Hess<br>Univ.-Prof. Dr. Alexander Kempf<br>Dr. Alexander Pütz<br>Dr. Wolfgang Spörk |
| **10** | **Miscellaneous** |

## SpM Finance II

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 1259BSMFI2 | 180h | 6 | German and English | every 2nd term - winter term | 1 Term |

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|---|---|---|---|---|
| **1** | **Courses**<br>a) Sustainable Finance<br>b) Bank Management<br>c) Leasing<br>d) Insurance Management | **Contact Hours**<br>a) 60h<br>b) 60h<br>c) 60h<br>d) 60h | **Self-Studies**<br>a) 120h<br>b) 120h<br>c) 120h<br>d) 120h | **Course Language**<br>a) German<br>b) German<br>c) German<br>d) German |

**2 Module Content**

a) Bank Management
- The German commercial banking system
- Central banks / supranational banks
- Bank Accounting
- Bank Controlling
- Bank regulation

b) Leasing
- German leasing market and leasing contracts
- Calculation of leasing rates
- Capital costs of leasing relationships
- Accounting of leasing relationships according to HGB and IFRS
- Cost comparison of leasing and loan financing taking into account tax circumstances
- Institutional economic analysis of leasing

c) Insurance Management
- Risk management and insurance production
- Limits of insurability
- Insurance and reinsurance markets / Historical roots of insurance
- Lines of individual insurance
- Reinsurance and alternative risk transfer
- Institutional framework
- Value-oriented insurance management

d) Sustainable Finance
- Sustainability ratings
- Sustainability performance of conventional and sustainable investments
- Financial performance of conventional and sustainable investments
- Sustainability in investment management
- Sustainability and asset pricing
- Regulations
- Research in the field of sustainable finance

**3 Learning Objectives**

Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... know and understand basic theories in the areas of Insurance, Banking and Leasing.
... know and understand common methods in the areas of Insurance, Banking and Leasing.
... use methods in the areas of Insurance, Banking and Leasing in pre-structured contexts in a solution-oriented way.

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| | ... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria. |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice |
| **5** | **Module Entry Requirements**<br>none |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of course a), b), c) or d) |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section |
| **9** | **Module Manager**<br>Jun.-Prof. Dr. Tobias Bauckloh<br>Univ.-Prof. Dr. Thomas Hartmann-Wendels<br>Univ.-Prof. Dr. Heinrich R. Schradin<br>Dr. Wolfgang Spörk |
| **10** | **Miscellaneous** |

| SpM Marketing I | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1266BSMMA1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Methods of Marketing Management (winter term) | | | **Contact Hours**<br>60h | **Self-Studies**<br>120h | **Course Language**<br>English |
| **2** | **Module Content**<br>• Design of market research projects<br>• Sample selection and survey methods<br>• Metrics and questionnaire design<br>• Uni- and bivariate analyses<br>• Application of multivariate analysis methods for marketing mix decisions<br>• Introduction to causal analysis | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand common methods and approaches of market research.<br>... analyse (current) questions and challenges in the context of market research projects and investigate expected cause-effect relationships.<br>... communicate in English. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: Core Module Marketing | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Hernán Bruno | | | | | |
| **10** | **Miscellaneous** | | | | | |

| SpM Marketing II | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1266BSMMA2 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Concepts of Marketing Mix Management (summer term) | | | **Contact Hours**<br>60h | **Self-Studies**<br>120h | **Course Language**<br>English |
| **2** | **Module Content**<br>• Marketing mix decisions (e.g. brand management and new product development)<br>• Management of innovations and established products<br>• Price and distribution management<br>• Communication management<br>• Service Management/ Service Marketing | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories and concepts of marketing in the domain of marketing mix management.<br>... analyse (current) questions and challenges in the context of marketing mix management.<br>... communicate in English. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: Core Module Marketing | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Marc Fischer | | | | | |
| **10** | **Miscellaneous** | | | | | |

| SpM Supply Chain Management I | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1271BSMSC1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses**<br>a) Procurement and Process Management<br>b) Supply Chain Planning<br>c) Behavioral Management Science I | | | **Contact Hours**<br>a) 45h<br>b) 45h<br>c) 30h | **Self-Studies**<br>a) 135h<br>b) 135h<br>c) 150h | **Course Language**<br>a) English<br>b) German<br>c) English |
| **2** | **Module Content**<br>Selected Topics in Supply Chain Management:<br><br>a) Procurement and Process Management<br>• Strategic Thinking<br>• Sourcing Analysis<br>• Sourcing Methods<br>• Supplier Management<br>• Behavioral Aspects<br><br>b) Supply Chain Planning<br>• Supply Chain Design<br>• Demand Planning<br>• Sales Planning<br>• Supply Chain Management<br><br>c) Behavioral Management Science I<br>• Behavioral economics and psychology<br>• Experimental methods<br>• Applications to different fields of management | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories in supply chain management.<br>... apply theories in supply chain management in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... know and understand common methods in supply chain management.<br>... use methods in supply chain management in pre-structured contexts in a solution-oriented way.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... present and/or discuss results with teaching staff and other students.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria.<br>... design their learning and working processes independently. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: Core Module Supply Chain Management | | | | | |

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| **6** | **Mode of End-Of-Module Examination**<br>Written test: PO |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of course a), b) or c) |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section |
| **9** | **Module Manager**<br>AD Dr. Johannes Antweiler<br>Area Supply Chain Management |
| **10** | **Miscellaneous**<br>For the winter semester 2023/24, the name of the course "a) Strategic Procurement" has been changed to "a) Procurement and Process Management". |

| SpM Supply Chain Management II | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>1271BSMSC2 | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every term | **Duration**<br>1 Term |

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|---|---|---|---|---|
| **1** | **Courses**<br>a) Strategy and Innovation<br>b) Production Management<br>c) Behavioral Management Science II | **Contact Hours**<br>a) 45h<br>b) 45h<br>c) 30h | **Self-Studies**<br>a) 135h<br>b) 135h<br>c) 150h | **Course Language**<br>a) English<br>b) German<br>c) English |

**2 Module Content**

Selected Topics in Supply Chain Management:

a) Strategy and Innovation
- Managing Projects and Processes
- Strategic Innovation in Supply Chains

b) Production Management
- Lot-Sizing and Scheduling
- Inventory Management

c) Behavioral Management Science II
- Behavioral economics and psychology
- Experimental methods
- Applications to different fields of management

**3 Learning Objectives**

Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... know and understand basic theories in supply chain management.
... apply theories in supply chain management in pre-structured contexts (e.g. case studies) in a solution-oriented way.
... know and understand common methods in supply chain management.
... use methods in supply chain management in pre-structured contexts in a solution-oriented way.
... analyse (current) questions and challenges within the framework of pre-structured contexts.
... communicate continuously and purposefully within teaching and learning groups.
... present and/or discuss results with teaching staff and other students.
... develop an understanding of the impact of decisions that take into account environmental, economic, social and/or ethical criteria.
... design their learning and working processes independently.

**4 Teaching and Learning Methods**

lecture
practice

**5 Module Entry Requirements**

Recommendation: Core Module Supply Chain Management

**6 Mode of End-Of-Module Examination**

Written test: PO

**7 Prerequisites for Awarding of Credit Points**

Passing the module examination of course a), b) or c)

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| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section<br>Bachelor of Science Betriebswirtschaftslehre:<br>Specialization Section |
| **9** | **Module Manager**<br>AD Dr. Johannes Antweiler<br>Area Supply Chain Management |
| **10** | **Miscellaneous** |

| EM Entrepreneurship | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1253BEEnt1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Entrepreneurship | | | **Contact Hours**<br>60h | **Self-Studies**<br>120h | **Course Language**<br>English |
| **2** | **Module Content**<br>• Strategies on Market Entry, Products, Markets and Value Creation<br>• Entrepreneurial Behaviour | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories.<br>... apply theories in pre-structured contexts (e.g. case studies) in a solution-oriented way.<br>... analyse (current) questions and challenges within the framework of pre-structured contexts.<br>... present and/or discuss results with teaching staff and other students.<br>... develop an understanding of the impact of decisions that take into account environmental,<br>... economic, social and/or ethical criteria. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommended: CM Corporate Development I | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (60) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing of the module examination. | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Betriebswirtschaftslehre:<br>Supplementary Section<br>Bachelor of Science Volkswirtschaftslehre:<br>Specialization Section<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section | | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Christian Schwens | | | | | |
| **10** | **Miscellaneous** | | | | | |

| Supplementary Module Studies Abroad | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1014SAMB02 | | **Workload**<br>360h | **ECTS Credits**<br>12 | **Module Language** | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses** | | | **Contact Hours** | **Self-Studies** | **Course Language** |
| **2** | **Module Content**<br>depending on course selection | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... describe approaches in business informatics, business administration and economics from an international perspective.<br>... explain international questions of business informatics, business administration and economics.<br>... discuss and compare different theories and approaches of business informatics, business administration and economics.<br>... develop new intellectual perspectives on their own educational background.<br>... be better equipped to effectively manage the dynamic global dimensions of their future careers. | | | | | |
| **4** | **Teaching and Learning Methods**<br>depending on course choice | | | | | |
| **5** | **Module Entry Requirements** | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>depending on course selection | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points** | | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section | | | | | |
| **9** | **Module Manager** | | | | | |
| **10** | **Miscellaneous**<br>Language: can be held in English or in any language offered at the host university. This module can be studied at a foreign university. In this case, there is a standardised course crediting procedure. Information about course crediting (deadlines and procedures) is available from the Credit Transfer Center (WiSo-Anrechnungszentrum : https://www.anrechnungwiso.uni-koeln.de/.) This module can also be studied as part of a Summer School organised by the WiSo-Faculty. In this case, the previous exam registration has to be done according to the regulations of the WiSo-Faculty. | | | | | |

## Supplementary Module Theoretical Computer Science

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 5722EMTI01 | 270h | 9 | German | every 2nd term - summer term | 1 Term |

| | Courses | Contact Hours | Self-Studies | Course Language |
|---|---|---|---|---|
| 1 | a) Logic for Computer Scientists<br>b) Graph Theory<br>c) Introduction to Theoretical Computer Science | a) 90h<br>b) 90h<br>c) 90h | a) 180h<br>b) 180h<br>c) 180h | a) German<br>b) German<br>c) German |

**2 Module Content**

a) Logics for Computer Scientists:

Syntax and semantics of the statement and predicate logic of the 1st level are covered. For the resolution calculus, which is of elementary importance for automatic proof, its completeness and correctness are proven. It also deals with horn logic and its key role in logic programming. In addition, complexity and decisionability issues as well as alternative axiomatization approaches are dealt with.

Finally, non-classical logics are presented, such as multivalent, fuzzy, temporal or modal logics, which are important for the modelling of many problems.

b) Graph Theory:

- Directional and non-directional graphs
- Context, circles and cuts
- Planarity and duality
- Euler's graphs
- Shortest paths, flows, matching: duality theorems and algorithms
- Node and edge staining, chromatic polynomial
- Perfect Graphs
- Extreme and random graphs, relationship with Ramsey numbers
- Properties of almost all graphs, tree width and partial k-trees

c) Introduction to Theoretical Computer Science:

The lecture conveys the theoretical foundations of computer science in the areas of formal languages, computability and complexity. The basic knowledge of computability and decidability theory, as well as complexity theory, conveyed in "Fundamentals of Computer Science II", will be further deepened in this course. Furthermore, a selection of randomized, approximative and online algorithms will be introduced and analyzed.

**3 Learning Objectives**

Students...

... know and understand the relevant methods and theories for the points mentioned above under „Module content“.

... Concepts and methods used in computer science are fundamentally influenced by logic. The concept of calculation, the exact distinction between syntax and semantics have enabled entire areas of computer science, such as programming languages, translator construction, specification, verification, expert systems and many others. In addition, the language of logic is the most important linguistic tool for clarifying complex problems.

... learn techniques and ways of thinking of this for the computer science fundamental area ((a) Logic for Computer Scientists).

... learn basic techniques and ways of thinking to solve discrete problems with graph-theoretical models ((b) Graphentheorie).

... learn the theoretical foundations of computer science in the areas of formal languages, computability and complexity.

... are introduced to a selection of randomized, approximate and online algorithms and analyze them ((c) Introduction to Theoretical Computer Science).

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| | ... deepen their specialist knowledge in the respective field and also acquire general skills for the classification, recognition, formulation and solution of problems through conceptual, analytical and logical thinking.<br>... deepen the lecture material in the exercises and acquire communication and presentation skills there. |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice |
| **5** | **Module Entry Requirements**<br>Recommended: Core Module Computer Science, Advanced Module Computer Science I, Advanced Module Computer Science II, Programming Project |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. One of three courses must be taken and the final module examination refers to the content of this one course. The module is passed and credit points are awarded if the 180-minute final exam is passed or the 30-45-minute oral final exam is passed. Depending on the number of participants, the exam or oral examination may be required. If prior notice is given, regular participation in the exercises and successful completion of exercises may be taken into account as a prerequisite for admission to the examination and included in the examination performance on a pro rata basis. |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät |
| **10** | **Miscellaneous**<br>Registration is required to take part in the final examination. One retest per cycle is offered. A repeated participation in the lecture and the exercises to prepare for a repetition of the final exam is possible. The module will be graded. The contents of the course cannot be learned exclusively through theoretical observation, therefore participation in the exercises and independent working on exercises is indispensable. For further information, please refer to the current website of the event. |

## Supplementary Module Practical Computer Science

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 5722EMPI00 | 270h | 9 | German | every term | 1 Term |

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|---|---|---|---|---|
| **1** | **Courses**<br>a) Efficient Algorithms<br>b) Algorithms for linear and discrete optimization<br>c) Parallel Algorithms | **Contact Hours**<br>a) 90h<br>b) 90h<br>c) 90h | **Self-Studies**<br>a) 180h<br>b) 180h<br>c) 180h | **Course Language**<br>a) German<br>b) German<br>c) German |

**2 Module Content**

a) Efficient Algorithms: We treat algorithms for combinatorial optimization problems that can be solved with efficient algorithms. After a short introduction to duality theory, the following topics will be covered: minimum spanning trees, shortest paths, maximum flows, flows with minimum costs, cardinality matching in bipartite and general graphs.

b) Algorithms for linear and discrete optimization:

After the introduction of the basic tools of linear programming and complexity theory, the lecture deals in particular with algorithms of linear (mixed) integer and combinatorial optimization. The focus is on the exact solution of mixed-integer decision and optimization problems by Branch-and-Bound, Branch-and-Cut, and Branch-and-Cut-and-Price algorithms. Furthermore, polynomial approximation algorithms for NP difficult problems are discussed. In the course of the lecture a selection of prominent combinatorial decision/optimization problems will be discussed: Fulfillability Problem, Traveler Problem, Linear Order Problem, Maximum Cut Problem, Node Cover Problem, Graph Coloration Problem, Clique Problem, Stable Set Problem, Backpack Problem, Crate Pack Problem, Machine Deployment Problem. In many cases, the discussion of the algorithms is motivated and supplemented by application examples in industry, business and the natural sciences.

(c) Parallel algorithms: The lecture covers a selection of the following topics:

The Parallel Random Access Machine (PRAM) and the Shared Memory Model

Basic design techniques for PRAM algorithms

Complexity classes NC, P, P complete

Parallel solution of numerical problems from linear algebra

Transformation of semisystolic algorithms into systolic communication in network-connected systems:

Network topologies, network embeddings, routing methods,

PRAM simulation on grid-connected systems, efficient load balancing,

Two card tricks and your solution with the help of SE networks

**3 Learning Objectives**

Students...

... know and understand the relevant methods and theories for the points mentioned above under „Module content“.

... receive basic knowledge of the conception and implementation of efficient algorithms and combinatorial structures on the basis of prominent problems for which polynomial solution methods are known ((a) Efficient Algorithms).

... acquire the algorithmic basics for the mathematical methods of Operations Research to solve NP-complete or NP-heavy combinatorial optimization and decision problems ((b) Algorithms for linear and discrete optimization).

... learn ways of thinking and techniques for the efficient use of parallel computer architectures.

... are able to design and implement powerful algorithms. are able to analyze algorithms with regard to correctness and their runtime behavior in dependence on data structures ((c) Parallel Algorithms).

... deepen their specialist knowledge in the respective field and also acquire further general skills for the classification, recognition, formulation and solution of problems through conceptual, analytical and logical thinking.

... expand the lecture material in the exercises and acquire communication and presentation skills.

**4 Teaching and Learning Methods**

lecture

practice

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| **5** | **Module Entry Requirements**<br>Recommended: Core Module Computer Science, Advanced Module Computer Science I, Advanced Module Computer Science II, Programming Project |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. One of three courses must be taken and the final module examination refers to the content of this one course. The module is passed and credit points are awarded if the 180-minute final exam is passed or the 30-45-minute oral final exam is passed. Depending on the number of participants, the exam or oral examination may be required. If prior notice is given, regular participation in the exercises and successful completion of exercises may be taken into account as a prerequisite for admission to the examination and included in the examination performance on a pro rata basis. |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section |
| **9** | **Module Manager**<br>Mathematisch-Naturwissenschaftliche Fakultät<br>Institut für Informatik |
| **10** | **Miscellaneous**<br>Registration is required to take part in the final examination. One retest per cycle is offered. A repeated participation in the lecture and the exercises to prepare for a repetition of the final exam is possible. The module will be graded. The contents of the course cannot be learned exclusively through theoretical observation, therefore participation in the exercises and independent working on exercises is indispensable. For further information, please refer to the current website of the event. |

## Supplementary Module Applied Computer Science

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 5722EMAI00 | 270h | 9 | German | every third term | 1 Term |

| | | | | |
|---|---|---|---|---|
| **1** | **Courses**<br>a) Modeling and Simulation<br>b) Automatic Drawing of Graphs | **Contact Hours**<br>a) 90h<br>b) 90h | **Self-Studies**<br>a) 180h<br>b) 180h | **Course Language**<br>a) German<br>b) German |

**2** **Module Content**

a) Modelling and Simulation:

- Life cycle of a simulation application
- Fundamentals of statistical methods
- Generation of random numbers
- Analysis and modelling methods
- Simulation methods
- Verification and Validation
- Evaluation of results and scenario analysis
- Application examples from modeling and simulation
- Special aspects of modelling and simulation

b) Automatic drawing of graphs:

Automatic drawing of graphs is a young and lively field of research. Here, algorithms are designed that generate aesthetically "beautiful" drawings of slide-grams (such as flowcharts, PERT diagrams, ER diagrams, event process chains, UML diagrams or networks). There are many different drawing methods, each of which optimizes different criteria. Example criteria for an aesthetically "beautiful" drawing are "few crossings", "few bends" or "as large an angle as possible".

In this lecture we will cover algorithms for drawing general (un-directed and directed) graphs as well as drawing methods for special graphs such as trees, directed acyclic graphs or planar graphs. In many cases, the discussion of the algorithms is motivated and complemented by application examples in industry, business and the natural sciences as well as the associated software.

**3** **Learning Objectives**

Students...

... know and understand the relevant methods and theories for the points mentioned above under „Module content“.

... are able to analyse real systems using stochastic methods, to create models from the analysis results and to implement these using suitable simulation methods and can validate the validity of the simulation application thus created and draw conclusions about the real system by creating and analysing scenarios (a) Modelling and simulation).

... acquire knowledge on how to visualize different classes of graphs based on their different properties and learn basic techniques for designing and implementing suitable algorithms (b) Automatic drawing of graphs).

... deepen their specialist knowledge in the respective field and also acquire further general skills for the classification, recognition, formulation and solution of problems through conceptual, analytical and logical thinking.

... expand the lecture material in the exercises and acquire communication and presentation skills.

**4** **Teaching and Learning Methods**

lecture

practice

**5** **Module Entry Requirements**

Recommended: Core Module Computer Science, Advanced Module Computer Science I, Advanced Module Computer Science II, Programming Project

| | |
|---|---|
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. One of three courses must be taken and the final module examination refers to the content of this one course. The module is passed and credit points are awarded if the 180-minute final exam is passed or the 30-45-minute oral final exam is passed. Depending on the number of participants, the exam or oral examination may be required. If prior notice is given, regular participation in the exercises and successful completion of exercises may be taken into account as a prerequisite for admission to the examination and included in the examination performance on a pro rata basis. |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät |
| **10** | **Miscellaneous**<br>Registration is required to take part in the final examination. One retest per cycle is offered. A repeated participation in the lecture and the exercises to prepare for a repetition of the final exam is possible. The module will be graded. The contents of the course cannot be learned exclusively through theoretical observation, therefore participation in the exercises and independent working on exercises is indispensable. For further information, please refer to the current website of the event. |

| Supplementary Module Technical Computer Science | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>5722EMTI00 | | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>2 Terms |
| **1** | **Courses**<br>Computer Graphics and Visualization<br>Algorithms | | | **Contact Hours**<br>90h | **Self-Studies**<br>180h | **Course Language**<br>German |
| **2** | **Module Content**<br>The first lecture of the two-semester course deals with (3D) computer graphics and human-machine communication. The lecture looks at aspects of human perception and introduces graphical output devices and color systems. Based on raster-based 2D graphics, interaction techniques and graphical user interfaces are explained. 3D computer graphics are used to introduce objects, projections, masking, lighting, and scene graphs. The second lecture introduces the term visualization, which is divided into information visualization and visualization of scientific data. Based on the visualization pipeline and scientific data types, the filtering and reconstruction of data is dealt with, the mapping of data to visual representations is introduced as a central concept and carried out using concrete algorithms. Information visualization for the representation of not locally distributed data is treated in detail. Volume rendering as an alternative method for the representation of three-dimensional data and virtual reality are also considered. The exercises include tasks for computer graphics, the creation of graphical user interfaces, as well as 2D and 3D programming, e.g. with applets and OpenGL. | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... acquire knowledge of 2D and 3D computer graphics, user interface technology, data visualization and the ability to handle complex visualization tasks conceptually and in terms of content.<br>... deepen their specialist knowledge in the respective field and also acquire further general skills for the classification, recognition, formulation and solution of problems through conceptual, analytical and logical thinking.<br>... expand the lecture material in exercises and also acquire communication and presentation skills there. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>Recommended: Core Module Computer Science, Advanced Module Computer Science I, Advanced Module Computer Science II, Programming Project | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. One of three courses must be taken and the final module examination refers to the content of this one course. The module is passed and credit points are awarded if the 180-minute final exam is passed or the 30-45-minute oral final exam is passed. Depending on the number of participants, the exam or oral examination may be required. If prior notice is given, regular participation in the exercises and successful completion of exercises may be taken into account as a prerequisite for admission to the examination and included in the examination performance on a pro rata basis. | | | | | |

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| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät |
| **10** | **Miscellaneous**<br>Registration is required to take part in the final examination. One retest per cycle is offered. A repeated participation in the lecture and the exercises to prepare for a repetition of the final exam is possible. The module will be graded. The contents of the course cannot be learned exclusively through theoretical observation, therefore participation in the exercises and independent working on exercises is indispensable. For further information, please refer to the current website of the event. |

| Supplementary Module Mathematics I | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>5722EMMa01 | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Introduction to Stochastics | | **Contact Hours**<br>90h | **Self-Studies**<br>180h | **Course Language**<br>German |
| **2** | **Module Content**<br>1. Probability Calculus<br>- Probability spaces, urns models<br>- Random variables, distributions, moments, inequalities<br>- Conditional probabilities, independence<br>- Independent random variables, common distribution<br>- Transformed from distributions, analytical tools<br>- Limit value records<br>- Random numbers, simulation<br><br>2. Statistics<br>- Statistical decision problems<br>- Special statistics and their distributions<br>- Estimation of parameters<br>- Testing hypotheses<br>- Confidence ranges<br>- Regression and Correlation<br>- Vistas | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... receive an introduction to probabilistic thinking.<br>... gain knowledge of the basic concepts and methods of mathematical stochastics needed to understand and solve application problems based on stochastic models.<br>... create models that describe stochastic phenomena.<br>... perform simple statistical tests.<br>... master concepts, techniques and methods of estimation and test theory and are able to apply them. | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | |
| **5** | **Module Entry Requirements**<br>Recommended: Core Module Mathematics | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section | | | | |

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| **9** | **Module Manager**<br>Mathematisches Institut<br>Mathematisch-Naturwissenschaftliche Fakultät |
| **10** | **Miscellaneous**<br>Parallel to the lecture there are exercises in which written homework is done, which can be completed successfully averaged over the semester. At the end of the lecture there is a written exam, the content of which is the material from the lecture and exercises. |

## Supplementary Module Mathematics II

| Module Code | Workload | ECTS Credits | Module Language | Module Availability | Duration |
|---|---|---|---|---|---|
| 5722EMMa02 | 270h | 9 | German | every 2nd term - summer term | 1 Term |

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|---|---|---|---|---|
| 1 | **Courses**<br>Introduction to the Mathematics of Operations Research | **Contact Hours**<br>90h | **Self-Studies**<br>180h | **Course Language**<br>German |

**2 Module Content**

1. Introduction: resilient matchings
2. Shortest ways
3. Minimum clamping beams
4. Polyhedral theory
5. The simplex method
6. The ellipsoid method
7. Matrix games and LP duality
8. Matchings in bipartite graphs
9. Network flows
10. Integer optimization and completely unimodular matrices
11. Integer optimization and fully dual integer systems

**3 Learning Objectives**

Students...

... know and understand the relevant methods and theories for the points mentioned above under „Module content“.

... gain knowledge of the basic concepts and methods of mathematical operations research needed to understand and solve problems in the field of business mathematics.

... gain the ability to apply mathematical concepts and methods in the development and application of algorithms.

**4 Teaching and Learning Methods**

lecture

practice

**5 Module Entry Requirements**

Recommended: Core Module Mathematics

**6 Mode of End-Of-Module Examination**

Written test: WT (180)

**7 Prerequisites for Awarding of Credit Points**

Passing the written test.

**8 Other Programmes that Use the Module**

Bachelor of Science Wirtschaftsinformatik:

Supplementary Section

**9 Module Manager**

Mathematisches Institut

Mathematisch-Naturwissenschaftliche Fakultät

**10 Miscellaneous**

Parallel to the lecture there are exercises in which written homework is done, which can be completed successfully averaged over the semester. At the end of the lecture there will be an exam, the content of which is the material from the lecture and exercises.

| Supplementary Module Mathematics III | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>5722EMMa03 | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Numerical Mathematics I | | **Contact Hours**<br>90h | **Self-Studies**<br>180h | **Course Language**<br>German |
| **2** | **Module Content**<br>Interpolation with Polynomials and (B-)Splines; Numerical Integration; if necessary, compensation and eigenvalue problems; Numerics of ordinary differential equations, such as one-step and multistep procedures, boundary value tasks. | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... gain knowledge of the basic concepts and methods of numerical mathematics as well as of scientific computing on the computer, which are required for understanding and solving problems in the field of applied mathematics and business mathematics. Basis for advanced modules in numerics. | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | |
| **5** | **Module Entry Requirements**<br>Recommended: Core Module Mathematics | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: WT (180) | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the written test. | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section | | | | |
| **9** | **Module Manager**<br>Mathematisches Institut<br>Mathematisch-Naturwissenschaftliche Fakultät | | | | |
| **10** | **Miscellaneous**<br>Parallel to the lecture there are exercises in which written homework is done, which can be completed successfully averaged over the semester. At the end of the lecture there is a written exam, the content of which is the material from the lecture and exercises. | | | | |

| SuM Information Systems I | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1277BEWIF1 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - winter term | **Duration**<br>1 Term |
| **1** | **Courses**<br>a) Systems Analysis and Design<br>b) Information Security and IT Forensics | | | **Contact Hours**<br>a) 60h<br>b) 40h | **Self-Studies**<br>a) 120h<br>b) 140h | **Course Language**<br>a) German<br>b) German |
| **2** | **Module Content**<br>a) Systems Analysis and Design<br>• Requirements analysis and survey<br>• System modelling<br>• Project planning<br>• Prototyping<br>• Unified Modeling Language (UML)<br>• Human-computer interaction<br>b) Information Security and IT Forensics<br>• Terms, protection goals, threat classifications<br>• Historical Case Studies and Conclusions for Future Situations<br>• Presentation of concrete attack techniques and threats<br>• Design of secure systems (consideration in the development process, frameworks, ISO/IEC 27001, risk analysis)<br>• Recognized frameworks (BSI Basic Protection, ISO 27001, Business Continuity Management, ...)<br>• Security models<br>• Fundamentals of cryptographic procedures<br>• Authentication procedures and identity management<br>• Mobile Security<br>• Incident Response and IT-Forensics<br>• Legal framework | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand common methods in the field of a) analysis and design of information systems; b) cryptographic procedures and protection requirements of information systems.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social or ethical criteria.<br>... design their learning and working processes independently. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: PO | | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of course a) or b) | | | | | |

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| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section |
| **9** | **Module Manager**<br>Sprecher des Fachbereichs Wirtschaftsinformatik |
| **10** | **Miscellaneous**<br>a) Systems Analysis and Design: In some sessions case studies and exercises are prepared in group work and presented and discussed in the plenum by the students. Mandatory reading will be announced during the respective semester. b) Information security and IT forensics: The course is usually offered by a lecturer and is offered as a block course in the first or second half of the semester. Please note the course dates given in KLIPS. Within the scope of the exercise, practical work with IT security gaps within a laboratory environment (hacking and subsequent security) will take place. Previous knowledge of Linux is useful, but not necessary. |

| SuM Information Systems II | | | | | | |
|---|---|---|---|---|---|---|
| **Module Code**<br>1277BEWIF2 | | **Workload**<br>180h | **ECTS Credits**<br>6 | **Module Language**<br>German and English | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>a) Information Systems Development<br>b) Introduction to Data Science and Machine Learning | | | **Contact Hours**<br>a) 60h<br>b) 30h | **Self-Studies**<br>a) 120h<br>b) 150h | **Course Language**<br>a) German<br>b) English |
| **2** | **Module Content**<br>a) Information Systems Development<br>• Processes and important challenges in the development of IS<br>• Alternatives for the realization of IS ("Make or Buy", Outsourcing, Software as a Service, etc.)<br>• Procedures for the development of IS (waterfall model, evolutionary development, agile software development)<br>• Concept and forms of project management for IS development<br>• Project control and evaluation methods<br>• Communication and leadership<br>• Time, team and project management<br>• Ethics in the development of IS<br><br>b) Introduction to Data Science and Machine Learning<br>• The value of data from a business perspective<br>• Data quality and data cleansing<br>• Design of a data analysis process<br>• Explanation vs. forecast<br>• Data visualization<br>• Use of data to support entrepreneurial activity<br>• Introduction to machine learning<br>• Programming language: Python | | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand common methods in the areas of (a Information Systems Development and (b Data Science and Machine Learning.<br>... use methods in the areas of (a Information Systems Development and (b Data Science and Machine Learning in pre-structured contexts in a solution-oriented way.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... present and/or discuss results with teaching staff and other students.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social or ethical criteria.<br>... design their learning and working processes independently. | | | | | |
| **4** | **Teaching and Learning Methods**<br>lecture<br>practice | | | | | |
| **5** | **Module Entry Requirements**<br>none | | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Written test: PO | | | | | |

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| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of course a) or b) |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Supplementary Section |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Kölner Institut für Wirtschaftsinformatik |
| **10** | **Miscellaneous**<br>Mandatory reading will be announced in the respective semester of the course. b) Python is used in the course. |

### 3.6.3 Specialisation Section

| **Programming Project** | | | | | |
|---|---|---|---|---|---|
| **Module Code**<br>5751PrPrak | **Workload**<br>270h | **ECTS Credits**<br>9 | **Module Language**<br>German | **Module Availability**<br>every 2nd term - summer term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Programming Project | | **Contact Hours**<br>30h | **Self-Studies**<br>240h | **Course Language**<br>German |
| **2** | **Module Content**<br>• Software development in teamwork<br>• Conceptual software design, division of the task into subtasks, interface definition between program components<br>• Implementation of the components and integration to an executable program<br>• Software testing and troubleshooting<br>• Preparation of a complete documentation and a project report | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... are able to analyse a given problem in self-organised and self-responsible group work, to break it down into subtasks, to design a software solution, to implement it in Java and to present the results.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... establish and evaluate independently developed positions.<br>... present and/or discuss results with teaching staff and other students.<br>... design their learning and working processes independently.<br>... use under guidance techniques of scientific work and good scientific practice. | | | | |
| **4** | **Teaching and Learning Methods**<br>project | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: CM Computer Science, AM Computer Science I | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Combined examination: WT (60), PO | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Specialization Section | | | | |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Institut für Informatik<br>Mathematisch-Naturwissenschaftliche Fakultät | | | | |
| **10** | **Miscellaneous**<br>During the first weeks, the tasks to be processed are presented by the internship supervisor. In this phase, the group divisions also take place. Subsequently, specifications and modularization of the individual tasks and interface definitions are carried out. The supervisor supervises this phase in an advisory or corrective way. The individual groups meet at least once a week to discuss the status | | | | |

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| | quo. At the end of the semester, the complete programme is presented in the presence of the supervisor. The examination consists of the Java software, the documentation, the proof of authorship and the presentations at the milestone presentations as well as the final acceptance of the project. In addition, a 15 to 45-minute examination can take place. A graded certificate of achievement is issued. |

| SpM Information Systems | | | | | |
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| **Module Code**<br>1277BSWIF1 | **Workload**<br>450h | **ECTS Credits**<br>15 | **Module Language**<br>German and English | **Module Availability**<br>every term | **Duration**<br>1 Term |
| **1** | **Courses**<br>Capstone Project Information Systems | | **Contact Hours**<br>90h | **Self-Studies**<br>360h | **Course Language**<br>German |
| **2** | **Module Content**<br>• Independent and autonomous development of an information system in a team in a project<br>• Project and team management<br>• Requirements analysis<br>• Draft<br>• Implementation<br>• Testing<br>• Customer communication and management | | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... communicate continuously and purposefully within teaching and learning groups.<br>... establish and evaluate independently developed positions.<br>... present and/or discuss results with teaching staff and other students.<br>... develop an understanding of the impact of decisions that take into account environmental, economic, social or ethical criteria.<br>... design their learning and working processes independently.<br>... reflect their own performance and implement feedback constructively. | | | | |
| **4** | **Teaching and Learning Methods**<br>Research project | | | | |
| **5** | **Module Entry Requirements**<br>Recommendation: CM Information Systems I, CM Information Systems II, AM Information Systems, SuM Information Systems I, SuM Information Systems II; CM Computer Science, SpM Computer Science, AM Computer Science I, AM Computer Science II | | | | |
| **6** | **Mode of End-Of-Module Examination**<br>Combined examination: PRES, PO | | | | |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination | | | | |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Specialization Section | | | | |
| **9** | **Module Manager**<br>Univ.-Prof. Dr. Christoph Rosenkranz | | | | |
| **10** | **Miscellaneous**<br>Important note: this course starts in the lecture-free period during which components of the portfolio are completed. Basic knowledge of programming, databases, modelling, architectures, data structures and algorithms as well as project management is required. The students work self-organized in teams. On fixed dates the teams have to present fixed milestones (e.g. requirement specification, requirement specification, sprint meeting, backlogs, intermediate presentation, final presentation, finished product incl. program code). The work results are compared and, if necessary, | | | | |

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| | corrected so that all teams are able to complete their development assignment. If necessary, the students receive training in the tools and methods to be used as part of a preliminary course. |

## Bachelor Seminar Information Systems

| **Module Code** | **Workload** | **ECTS Credits** | **Module Language** | **Module Availability** | **Duration** |
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| 1277BSSWF1 | 180h | 6 | German and English | every term | 1 Term |

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| **1** | **Courses**<br>a) Bachelorseminar Information Systems for Sustainable Society (Prof. Ketter)<br>b) Bachelorseminar Information Systems and Digital Technology (N.N.)<br>c) Bachelorseminar Integrated Information Systems (Prof. Rosenkranz)<br>d) Bachelorseminar Information Management (Prof. Schoder) | **Contact Hours**<br>a) 30h<br>b) 30h<br>c) 30h<br>d) 30h | **Self-Studies**<br>a) 150h<br>b) 150h<br>c) 150h<br>d) 150h | **Course Language**<br>a) German and English<br>b) German and English<br>c) German and English<br>d) German and English |
| **2** | **Module Content**<br>• Project planning in the context of scientific work<br>• Structure and argumentation in scientific works: problem, objective, terminology system, outline<br>• Dealing with scientific literature: literature research, literature administration, literature evaluation, referencing and citation in scientific work<br>• Scientific Writing<br>• Formal requirements<br>• Writing, presenting and defending one's own scientific work<br>Seminar work topics are taken from the following areas, among others:<br>a) Business Intelligence, Analytics, Machine Learning and Learning Agents research in the domains of Energy Markets, Smart Sustainable Mobility, Energy Storage and Transactive Energy & Blockchain<br>b) Conceptual Modeling, Business Process Management, Information Systems Development, Systems Analysis and Design, Digital Innovation, Digital Entrepreneurship, Green IS, Environmental Sustainability<br>c) IT Outsourcing, IT Strategy, Information Systems Development & IT Project Management, Open Source Software Development, Agile Development, Business Process Management, Digital Transformation<br>d) Media Mass Customisation, Electronic Commerce, Social Media & Social Network Analysis, Openness, Management of information spheres and IT platforms, Decision Support Systems, artificial intelligence | | | |
| **3** | **Learning Objectives**<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know and understand basic theories from the above mentioned areas.<br>... collect, systematize and synthesize literature and data material for a scientific work on a selected topic.<br>... present and/or discuss results with teaching staff and other students.<br>... reflect their own performance and implement feedback constructively.<br>... use under guidance techniques of scientific work and good scientific practice. | | | |
| **4** | **Teaching and Learning Methods**<br>seminar | | | |
| **5** | **Module Entry Requirements**<br>none | | | |

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| **6** | **Mode of End-Of-Module Examination**<br>Combined examination: PRES, TP |
| **7** | **Prerequisites for Awarding of Credit Points**<br>Passing the module examination of one of the courses a) to d) |
| **8** | **Other Programmes that Use the Module**<br>Bachelor of Science Wirtschaftsinformatik:<br>Specialization Section |
| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Kölner Institut für Wirtschaftsinformatik |
| **10** | **Miscellaneous**<br>In the first step, the Bachelor's seminar module is taken by students via KLIPS. This allocation takes place in the 1st allocation phase through the submission of prioritised allocation requests. When enrolling via KLIPS, priority enrolment requests must be submitted for the Bachelor's seminars offered by the various examiners. As a rule, there will be no booking in the 2nd occupancy phase or in the allocation of remaining places. Subsequently, each student is allocated a place in a Bachelor's seminar, taking into account the available capacities. After the allocation to the Bachelor seminars, the students give preferences for concrete seminar work topics. This is usually done at the beginning of the semester via a survey in ILIAS. Part of the Bachelor's seminar is the participation in the block course "Scientific Work", which is offered at the beginning of the semester. Further information on the allocation procedure and the block course can be found in the course descriptions in KLIPS or on the website of the Cologne Institute for Information Systems. The seminar paper can be written in German or English. It is strongly recommended to complete the Bachelor's seminar before the Bachelor's thesis, as the Bachelor's seminar teaches basic competences for scientific work and especially for writing a scientific paper. |

### 3.6.4 Bachelor Thesis

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<tr><th colspan="6">Thesis Bachelor Information Systems</th></tr>
<tr><td colspan="2">Module Code<br>1277BaWi00</td><td>Workload<br>360h</td><td>ECTS Credits<br>12</td><td>Module Language<br>German</td><td>Module Availability<br>every term</td><td>Duration<br>1 Term</td></tr>
<tr><td>1</td><td colspan="3">Courses<br>a) Bachelor Thesis with Prof. Dr. Ketter<br>b) Bachelor Thesis with N.N.<br>c) Bachelor Thesis with Prof. Dr. Rosenkranz<br>d) Bachelor Thesis with Prof. Dr. Schoder</td><td>Contact Hours<br>a) 0h<br>b) 0h<br>c) 0h<br>d) 0h</td><td>Self-Studies<br>a) 360h<br>b) 360h<br>c) 360h<br>d) 360h</td><td>Course Language<br>a) German and English<br>b) German and English<br>c) German and English<br>d) German and English</td></tr>
<tr><td>2</td><td colspan="6">Module Content<br>Preparation of a scientific thesis.<br>Bachelor thesis topics are taken from the following areas, among others:<br>a) Business Intelligence, Analytics, Machine Learning and Learning Agents research in the domains of Energy Markets, Smart Sustainable Mobility, Energy Storage and Transac-tive Energy & Blockchain b) Conceptual Modeling, Business Process Management, Information Systems Develop-ment, Systems Analysis and Design, Digital Innovation, Digital Entrepreneurship, Green IS, Environmental Sustainability c) IT Outsourcing, IT Strategy, Information Systems Development & IT Project Management, Global Software Development, Agile Development, Business Process Management, Enterprise Systems d) Media Mass Customization, Electronic Commerce, Social Media & Social Network Analysis, Openness, Management von information spheres und IT-platforms, Decision Support Systems, artificial intelligence</td></tr>
<tr><td>3</td><td colspan="6">Learning Objectives<br>Students...<br>... know and understand the relevant methods and theories for the points mentioned above under „Module content“.<br>... know the current state of the theoretical and methodical discussions of the subject.<br>... identify specifically defined scientific questions and problems.<br>... work on these specific questions independently and in exchange with teachers and students on the basis of the relevant literature.<br>... know theoretical and methodical (qualitative and/or quantitative) approaches to scientific work.<br>... create an investigation design and implement it independently.<br>... organise and design a scientific work process for a clearly defined task.<br>... develop scientifically and socially relevant conclusions.</td></tr>
<tr><td>4</td><td colspan="6">Teaching and Learning Methods<br>Bachelor’s Thesis</td></tr>
<tr><td>5</td><td colspan="6">Module Entry Requirements<br>100 CP successfully passed; Recommended: Bachelor Seminar</td></tr>
<tr><td>6</td><td colspan="6">Mode of End-Of-Module Examination<br>Written test 12 weeks</td></tr>
<tr><td>7</td><td colspan="6">Prerequisites for Awarding of Credit Points<br>Passing the written test.</td></tr>
<tr><td>8</td><td colspan="6">Other Programmes that Use the Module<br>Bachelor of Science Wirtschaftsinformatik:<br>Bachelorthesis</td></tr>
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| **9** | **Module Manager**<br>Geschäftsführende*r Direktor*in Kölner Institut für Wirtschaftsinformatik |
| **10** | **Miscellaneous**<br>Bachelor theses at the Cologne Institute for Information Systems are awarded in a central award procedure. In the first step, the Bachelor's thesis module is assigned to students via KLIPS. This allocation takes place in the 1st allocation phase through the submission of prioritised allocation requests. In the case of KLIPS, prioritized requests for the Bachelor thesis modules offered by the various examiners must be submitted. As a rule, there will be no enrolment in the 2nd phase or in the allocation of remaining places. Subsequently, each student is allocated a place for a Bachelor's thesis, taking into account the available capacities. After the allocation to the examiners, the students give preferences for concrete Bachelor thesis topics. This is usually done about three weeks before the respective start date via a survey in ILIAS. Further information on the award procedure can be found in the course descriptions in KLIPS or on the website of the Cologne Institute for Information Systems. The Bachelor thesis can be written in German or English. It is strongly recommended that you complete the Bachelor's seminar before writing your Bachelor's thesis, as the Bachelor's seminar teaches basic skills for scientific work and especially for writing a scientific paper. Please note that the Cologne Institute for Information Systems (CIIS) offers Bachelor theses in every semester. Each semester you can start working on your bachelor thesis at a fixed starting time (in November in winter semesters and in May in summer semesters). |