2023/24

Please keep in mind the year of validity.

FACULTY OF MANAGEMENT,
ECONOMICS AND SOCIAL
SCIENCES

UNIVERSITY OF COLOGNE

VICE DEAN OF STUDIES
DEPARTMENT

MODULE CATALOGUE

BUSINESS ANALYTICS & ECONOMETRICS

MASTER OF SCIENCE

IN ACCORDANCE WITH THE EXAMINATION REGULATIONS FOR THE SINGLE MAJOR MASTER PROGRAMME IN BUSINESS ANALYTICS & ECONOMETRICS

Academic Director	Univ.-Prof. Dr. Markus Weinmann
Programme Director	Prof. Dr. Reiner Dyckerhoff
Editor	Vice Dean of Studies Department - WiSo Faculty
Student Services	WiSo-Student Service Point (WiSSPo) +49 (0) 221 / 470 - 8818 www.wiso.uni-koeln.de/enquiry
Status	Taking effect on 01/10/2023

List of abbreviations

AM	Advanced module	PRES	Presentation
AS	Assignment	SI	Studium Integrale
C	Course	SpM	Specialisation module
CC	Compulsory course	SuM	Supplementary module
CH	Contact hours (= time spent in class)	SPW	Semester period per week
CM	Core module	SSt	Self-study
EC	Elective course	TP	Term paper
ECTS	Credit point (ECTS)	TPF	Time required for preparation and follow-up
OE	Oral examniation	TR	Credit points transferred from an-other university
PCR	Practical component report	WL	Workload
PO	Portfolio	WT	Written test
PR	Project		

Table of contents

1 Business Administration

1.1 Content and objectives of the programme

Graduates of the Business Analytics & Econometrics program have competencies at the Master's level of the German Qualifications Framework, which corresponds to level 7 of the German Qualifications Framework. The following Learning Outcomes are intended:

	Graduates act as/with…
Subject-related and analytical competencies	**...experts for machine learning as well as for statistical methods to analyze and design business and economic challenges.**
	Students use machine learning and statistical methods as well as subject-specific concepts in all areas of business and economics.
	Students analyze management and economic theories, taking into account environmental, social, and ethical criteria in these areas.
	...innovative problem solvers:in order to develop effective strategies in the context of business analytics and econometrics.
	Students apply appropriate methods and independently developed theory-based solution strategies to subject-specific problems.
	The students independently write solution approaches to business and economic issues on the basis of collected data or structured literature, e.g. in the context of a scientific paper in this field
Communicative and cooperative competencies	**...communication strategies in business analysis and econometrics in order to support decision-making processes in a scientifically sound manner.**
	Students act cooperatively in international and heterogeneous teams.
	Students discuss scientific topics with people from theory and practice on the basis of independently developed positions and solutions.
Personal competencies	**...leaders in a globalized world to meet future challenges.**
	Students evaluate the impact of business and economic decisions on the achievement of corporate or societal goals.
	Students lead teams responsibly and purposefully, taking into account environmental, social and ethical criteria.
	...independent and self-reflective decision-makers:in order to continuously develop their own competencies in practice.
	The students design their learning, working and development processes independently.
	Students assume leadership roles in different contexts.

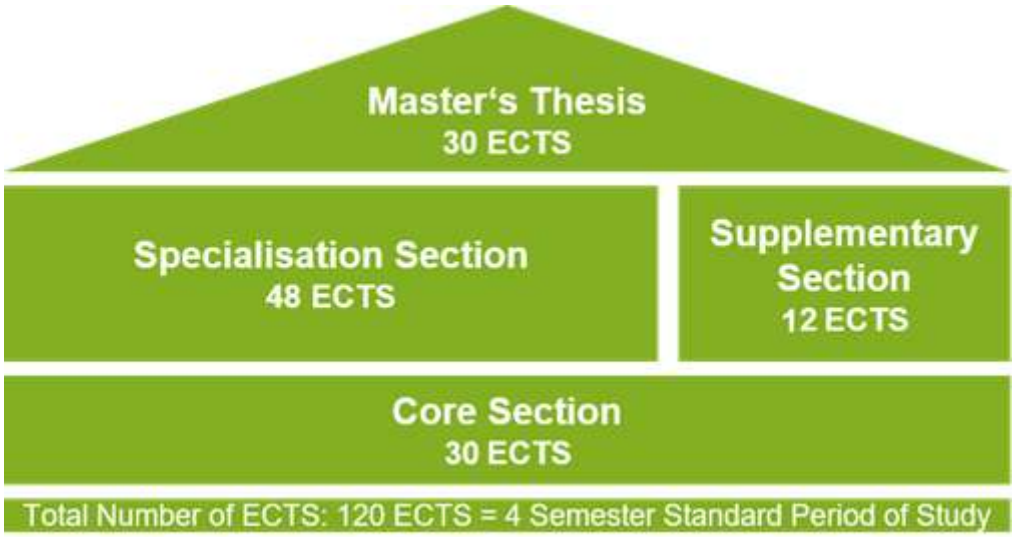
1.2 Requirements

The admission requirement for the study programme is the completion of professionally qualifying degree in a relevant bachelor's programme. The programme should have had a minimum duration of at least six semesters, in which at least 180 credit points were acquired, or an equivalent successfully completed course of study with a final grade of 2.7 or better. Furthermore, B2 English language skills are required at the beginning of the programme.

These and other subject-related requirements for the course of study are defined in the **admission regulations.**

1.3 Programme structure

The Master in Business Analytics & Econometrics is a 120 ECTS credits programme, with a standard study period of four terms and is made up of the following subject categories: The core section (30 ECTS credits) consists of basic method modules, chosen by the student. The specialisation section (48 ECTS credits) consists of modules for the respective major and a seminar. In the supplementary section (12 ECTS credits), students can choose from among a wide range of offerings in the fields of business administration, information systems and data analysis. The last section is the master's thesis, worth 30 ECTS Credits.



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 and are exempt from paying tuition fees there. The range of universities available depends on the master programme in which the student is enrolled – the possible options are listed in the **WiSo EXchange (WEX) International Outgoings Portal** (access through the student's UoC account only), along with detailed information on each university.

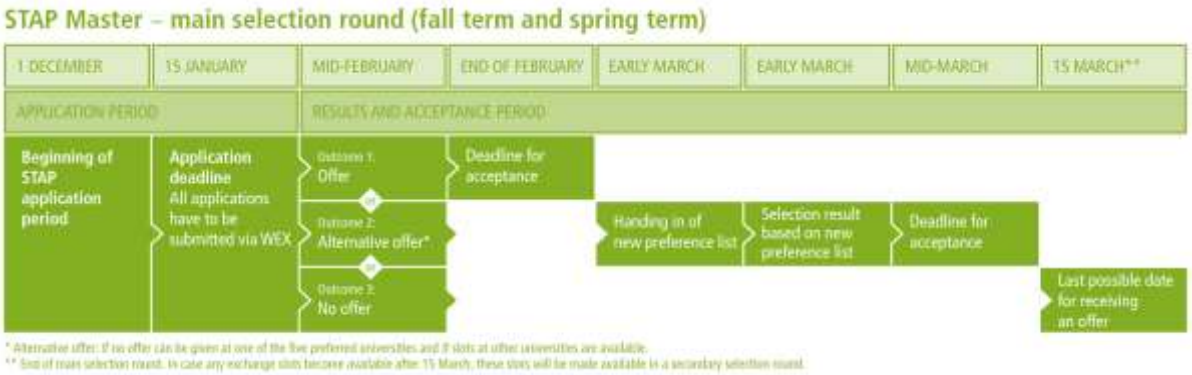
Every year, in addition to the STAP programme, the WiSo Faculty organises an exclusive short-term study option WiSo@NYC which takes place in New York City.

In addition to these options offered by the Faculty, master 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 include going abroad as a freemover (i.e. as a student who organises his or her stay abroad independently) or participating in short courses or summer schools offered under separate terms and conditions.

The **International Relations Center (**ZIB WiSo**)** serves as point of information and advice for all study abroad options.

The Faculty's Study Abroad me (STAP):

Master students should plan and submit their application for a term abroad at the beginning of their master studies. The STAP main selection round takes place once a year with application deadline 15 January and 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 in the **STAP Master Application Manual**. As an exception, if a certain number of slots are still available for spring term, a secondary STAP selection round will be offered in May, with a limited choice of exchange opportunities.

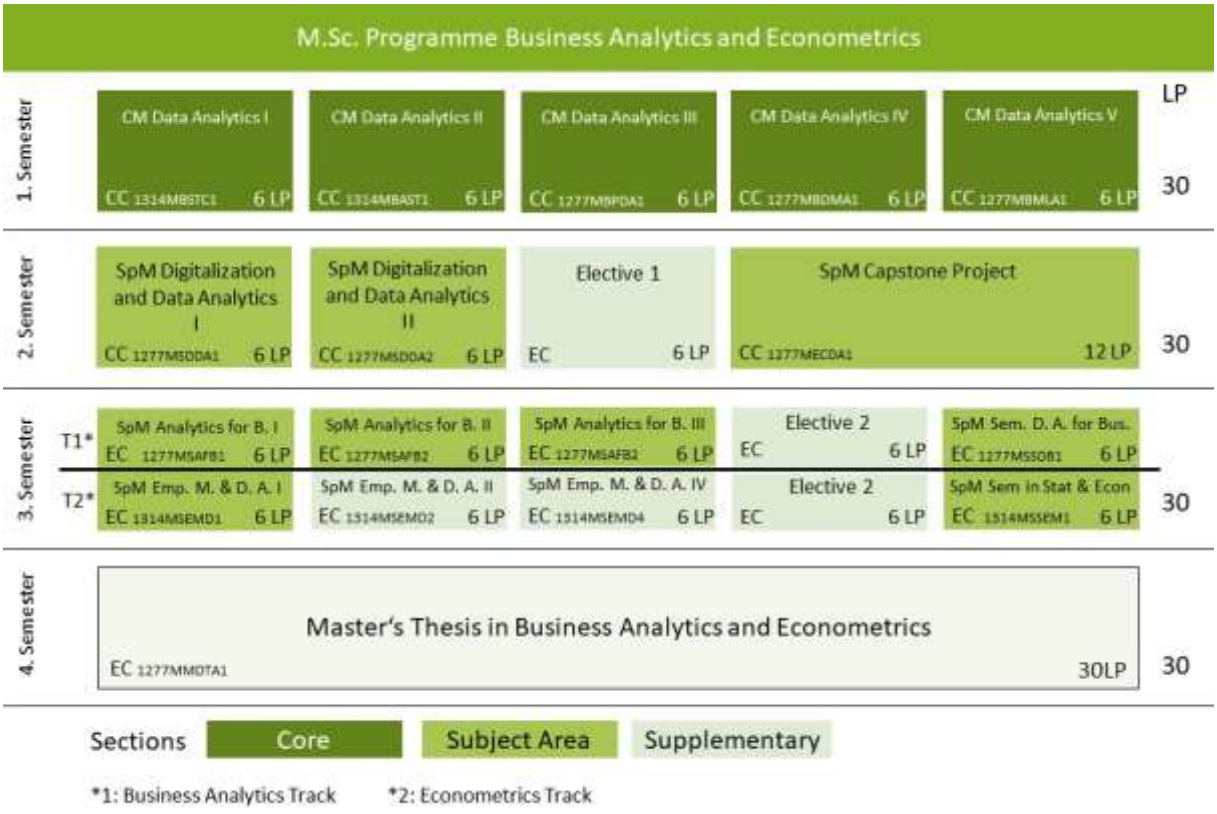


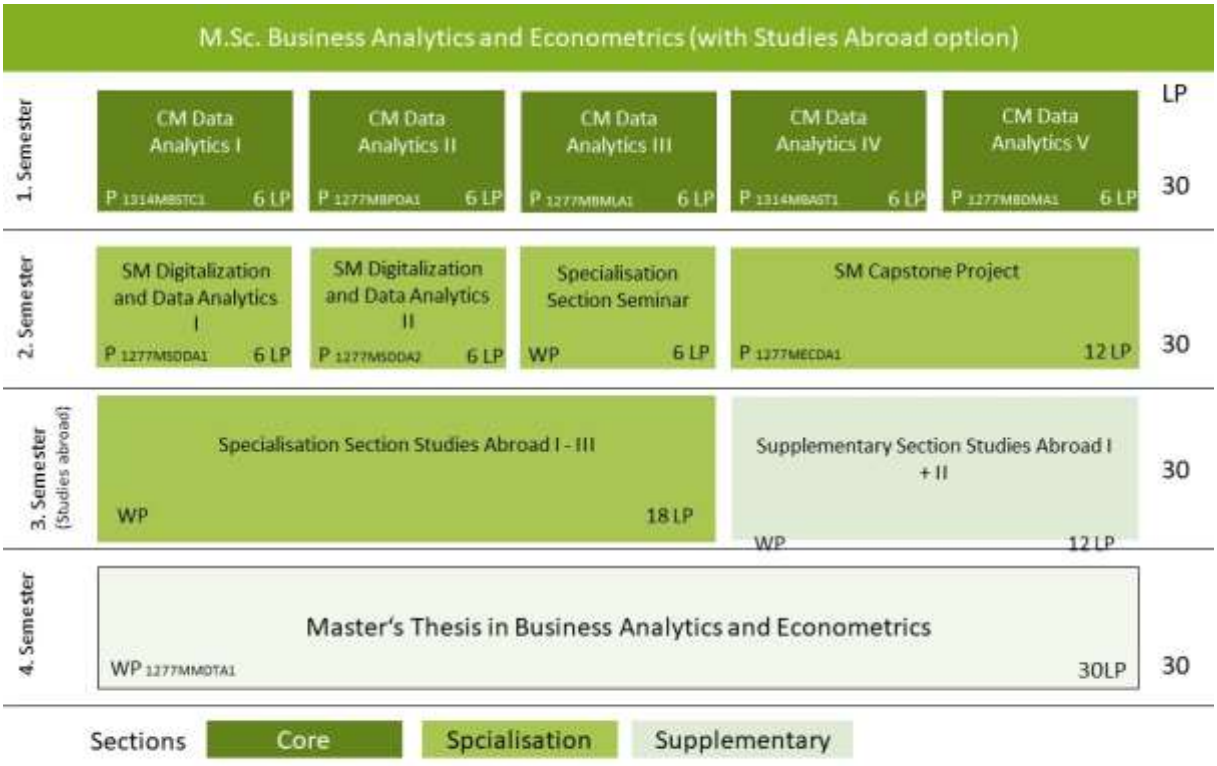
Credit transfer options from studies abroad:

The WiSo Faculty has put a lot of emphasis on internationalisation in the design of its master courses, offering broad credit transfer options for all kinds of study abroad options. Each master 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. For more information on credit transfer rules and regulations, please go to **WiSo Credit Transfer Center** > Information > Studies Abroad. For any questions regarding credit transfer, students can contact the **ZIB WiSo** or the **WiSo Credit Transfer Center**.

1.5 Sample study plan

A semester abroad is recommended in the third or fourth semester.





1.6 Modules with mid-term examinations

Some modules have courses that only run for half a term, 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 marks for core, supplementary and specialisation categories are calculated as the weighted arithmetic mean of the marks for the respective modules, based on the weighting system described in the examination regulations. In the case of end-of-module examinations consisting of several components, the mark for the module is calculated as specified in the **examination regulations.**

The overall mark for the degree is calculated as the weighted arithmetic mean of the marks for the subject categories and the mark for the master's thesis. On the Business Administration me, the weighting for the contributions to the overall mark is as follows:

a) Mark for core section: 30 of 120 ECTS credits
b) Mark for specialisation section: 48 of 120 ECTS credits
c) Mark for supplementary section: 12 of 120 ECTS credits
d) Mark for master's thesis: 30 of 120 ECTS credits

1.8 Rules for failed attempts

Students may retake module examinations they have failed. The number of attempts is limited to three per module. Modules offered by faculties other than the Faculty of Management, Economics and Social Sciences ("WiSo Faculty") may be subject to different rules.

After failing an exam three times, the **WiSo Student Service Point (WiSSPo)** provides information regarding the possibility of and requirements for receiving additional resit attempts. If none of the first three examination attempts were failed due to cheating or to an offence, an additional two resit attempts can be granted at any point during the me. Students who have accumulated at least 90 credit points can be granted an extra additional attempt. If a student fails an examination in the two additional attempts and the extra attempt for students with 90 points or more, they are deemed to have failed the me at the final 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 resit module examinations that have already been passed.
A failed master’s 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 organisation 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 advice and examination advice

The **WiSSPo** provides general advice on studies, including the possibilities available and the requirements, for all mes offered by the WiSo Faculty. Further services include the issuing of transcripts of records in German and English, ranking certificates and letters of assignment to the appropriate term of the me and the application for advanced / higher semester. The WiSSPo is also the first place to turn to for students with questions and problems related to their studies. Advisors can be contacted by phone, in person and, of course, through e-mail. Make a note of the opening hours and contact data on the website.

Subject-specific advice is offered during the designated times by the University’s faculty members and associated teaching staff (“akademische Mitarbeiter/innen”) involved in teaching

in the me. 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.**

2.4 Other sources of information and advice

International students who study at the WiSo Faculty for part of their me can request help from the **International Relations Center** with any questions they have. Cologne University students preparing to study abroad can also contact the ZIB for support. ZIB also offers a variety of summer schools, short mes and Business English courses. The services, courses and people to contact can all be found on the website.
The Faculty's **Credit Transfer Centre** 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 me. This system does away with 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 website.
The **WiSo Career Serive** offers advice and support, in cooperation with other partners, to students from the WiSo Faculty looking for the internship or profession that is right for them. It also assistes students in planning their career and applying for jobs. Additionally, the WiSo Career Service organises seminars, presentations and special events in cooperation with employers and external and internal experts. All of the necessary information can be found on the website.
The **WiSo IT Service** runs regular courses dealing with standard software and field-specific s.

Students who are having difficulties with their studies or their personal lives can seek help from the **Psychosocial Counselling Service** run by the Kölner Studentenwerk. In addition to counselling, advice on writing and learning skills plus support for pregnant students and students who have children is provided.
A further service is **Nightline** Köln, the listening and information helpline run by students for students at all of Cologne's institutions of higher education.
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 Curriculum and module descriptions

3.1 Core section

In accordance with section 29(1), No. 1 of the Examination Regulations, the examination candidate must obtain 30 ECTS credits in the core section.

Group	Module	ECTS	CC/ EC	Required ECTS
Core section Business Analyticcs & Econometrics	CM Data Analytics I	6	CC	30
	CM Data Analytics III	6	CC	
	CM Data Analytics V	6	CC	
	CM Data Analytics II	6	CC	
	CM Data Analytics IV	6	CC	

3.2 Specialisation section

In accordance with section 29(1), No. 2 of the Examination Regulations, the examination candidate must obtain 48 ECTS credits in the specialisation section.

Group	Module	ECTS	CC/ EC	Required ECTS
Compulsories	SpM Digitalization and Data Analytics I	6	P	24
	SpM Digitalization and Data Analytics II	6	P	
	SpM Capstone Project	12	P	
Electives	SpM Analytics for Business II	6	EC	24
	SpM Analytics for Business III	6	EC	
	SpM Analytics for Business I	6	EC	
	SpM Seminar Data Analytics for Business	6	EC	
	Studies Abroad in Business Analytics I	6	EC	
	Studies Abroad in Business Analytics II	6	EC	
	Studies Abroad in Business Analytics III	6	EC	
Electives	SpM Empirical Methods and Data Analysis I	6	EC	24
	SpM Empirical Methods and Data Analysis II	6	EC	
	SpM Empirical Methods and Data Analysis IV	6	EC	
	SpM Seminar in Statistics and Econometrics	6	EC	
	Studies Abroad in Econometrics I	6	EC	
	Studies Abroad in Econometrics II	6	EC	
	Studies Abroad in Econometrics III	6	EC	

3.3 Supplementary section

In accordance with section 29(1), No. 3 of the Examination Regulations, the examination candidate must obtain 12 ECTS credits in a sub-group of the supplementary section.

Group	Module	ECTS	CC/EC	Required ECTS
Supplementary Section	SpM Empirical Methods and Data Analysis I	6	WP	12
	SpM Empirical Methods and Data Analysis II	6	WP	
	SpM Empirical Methods and Data Analysis III	6	WP	
	SpM Empirical Methods and Data Analysis IV	6	WP	
	SpM Empirical Methods and Data Analysis V	6	WP	
	SpM Information Systems I	6	WP	
	SpM Information Systems II	6	WP	
	SpM Information Systems III	6	WP	
	SpM Marketing Performance Management	6	WP	
	SpM Business Project	12	WP	
	SpM Controlling I	6	WP	
	SpM Controlling II	6	WP	
	SpM Advanced Accounting	6	WP	
	CM People Analytics & Econometrics	6	WP	
	CM Advanced Econometrics I	6	WP	
	CM Advanced Econometrics II	6	WP	
	SpM Seminar Empirical Methods and Data Analysis	6	WP	
	SpM Analytics for Business II	6	WP	
	SpM Analytics for Business III	6	WP	
	SpM Analytics for Business I	6	WP	
	SpM Seminar in Statistics and Econometrics	6	WP	
	SpM Seminar Data Analytics for Business	6	WP	
	Studies Abroad I	6	WP	

	Studies Abroad II	6	WP	

3.4 Extracurricular course me

In addition to their regular studies master's students have the opportunity to take part in extracurricular courses, in which both academic and vocational skills are taught. Thus, studies can have an academic and a professional orientation, serving development of professional competences. The extracurricular course me intends to promote and impart competences that go beyond specialist knowledge or that concern basic scientific or personal attitudes, such as: scientific curiosity, systematic and analytical thinking, dealing with complexity, solution-orientation, the ability to work in a team, foreign language competence and other skills.
The extracurricular course me is offered jointly by the faculties and the Professional Centre of the University of Cologne. The me enables students to pursue their own additional interests, to gain insights into other subjects and faculties, to attend events of social importance, to acquire professionally relevant skills and to attend language courses. In addition, students are offered learning and study aids as part of the extracurricular me, e.g. for scientific work or literature research. Extracurricular courses are not credited, but the participation is noted on the transcript of records.

3.5 Master’s thesis

The master’s thesis, which carries 30 ECTS credits, is written towards the end of the me. It is intended to show that the student is capable of conducting academic work on and reflecting on a specific problem related to the subject matter covered in the me, while using the necessary methods within a specified period. The topic of the master’s thesis in Business Analytics & Econometrics must come from the specialisation section or from the subject group taken by the candidate in the supplementary section. If the topic relates to the supplementary section, the candidate must already have accumulated 12 ECTS credits in said supplementary section. Group master’s theses are also permitted provided a clear distinction between and assessment of each candidate’s contribution is possible. Objective criteria that make a clear distinction possible, such as sections, page numbers or topics, are used to indicate which student made which contribution. The total workload required of each group member must exceed the requirements for individual masters’ theses to an appropriate extent. The difficulty and content of a group thesis must meet the same requirements as for theses undertaken individually and independently. The contribution made by each individual must meet the requirements for masters’ theses.
To register to do their master’s thesis, students must have accumulated a minimum of 60 ECTS credits. They may take no longer than six months to write the thesis. More detailed information on master’s theses can be found in the Examination Regulations.

3.6 Module descriptions

3.6.1 Core Section

<table>
<tr><th colspan="7">CM Data Analytics I</th></tr>
<tr><td colspan="2">Module Code
1314MBSTC1</td><td>Workload
180h</td><td>ECTS Credits
6</td><td>Module Language
English</td><td>Module Availability
every 2nd term - winter term</td><td>Duration
1 Term</td></tr>
<tr><td>1</td><td colspan="3">Courses
Statistics for Data Analytics</td><td>Contact Hours
45h</td><td>Self-Studies
135h</td><td>Course Language
English</td></tr>
<tr><td>2</td><td colspan="6">Module Content
• Probability theory: Probabiltity distributions, (conditional) density functions
• Linear (multiple) regression, conditional expectation function
• Assumptions, model selection, hypotheses test
• Maximum Likelihood
• Time Series</td></tr>
<tr><td>3</td><td colspan="6">Learning Objectives
Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... understand advanced, specialized theories / methods in the field of statistics.
... analyse current questions and challenges in the field of statistics.
... assess and discuss findings and research results of specialized theories / methods.
... act responsibly considering ecological, social and ethical criteria.
... develop work processes for real problems and challenges.</td></tr>
<tr><td>4</td><td colspan="6">Teaching and Learning Methods
lecture
practice</td></tr>
<tr><td>5</td><td colspan="6">Module Entry Requirements
none</td></tr>
<tr><td>6</td><td colspan="6">Mode of End-Of-Module Examination
Written test: WT (90)</td></tr>
<tr><td>7</td><td colspan="6">Prerequisites for Awarding of Credit Points
Passing the module examination.</td></tr>
<tr><td>8</td><td colspan="6">Other Programmes that Use the Module
Master of Science Business Administration - Accounting and Taxation:
Supplementary Section Accounting and Taxation
Master of Science Business Administration - Finance:
Supplementary Section Finance
Master of Science Business Administration - Marketing:
Supplementary Section Marketing
Master of Science Information Systems:</td></tr>
</table>

	Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Core Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Arts Politikwissenschaft: Supplementary Section Political Science Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Jun. Prof. Dr. Sven Otto
10	**Miscellaneous** Literature: Wooldridge, "Introductory Econometrics" (chapter 1-9)

CM Data Analytics II					
Module Code 1277MBPDA1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Programming for Data Analytics		**Contact Hours** 30h	**Self-Studies** 150h	**Course Language** English
2	**Module Content** • Introduction to the statistical software R, including statistical modelling in R • Use of R for data analysis and presentation • Introduction to programming in R and the design of user-defined statistical diagrams				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of programming and data analytics. ... analyse current questions and challenges in the field of programming and data analytics. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Economic Research:				

	Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Core Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Arts Politikwissenschaft: Supplementary Section Political Science Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann
10	**Miscellaneous** Literature: Wickham, "R for Data Science"

CM Data Analytics III					
Module Code 1277MBMLA1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Machine Learning and Artificial Intelligence		**Contact Hours** 60h	**Self-Studies** 120h	**Course Language** English
2	**Module Content** • Basics of the methods of Machine Learning and Artificial Intelligence (AI) • Basics of both supervised and unsupervised methods (e.g. decision trees, random forests, boosting, support vector machines, neural networks, deep and opponent learning, ensemble learning, principal component analysis, factor analysis and diverse learning or multidimensional scaling) • Translation of business problems into machine learning use cases; feasibility and impact • Responsible implementation of machine learning projects in compliance with ethical standards				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of machine learning and AI. ... analyse current questions and challenges in the field of machine learning and AI. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management				

	Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Core Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Arts Politikwissenschaft: Supplementary Section Political Science Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann
10	**Miscellaneous** Literature: James, Witten, Hastie, Tibshirani, "Intorduction to statistical learning"

CM Data Analytics IV					
Module Code 1314MBAST1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Advanced Statistics for Data Analysis		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Potential Outcomes and Treatment Effects • Randomized Experiments • Matching Estimators • Regression Discontinuity • Instrumental Variables • Difference-in-Differences Estimation				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of advanced statistics. ... analyse current questions and challenges in the field of advanced statistics. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management				

	Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Core Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Arts Politikwissenschaft: Supplementary Section Political Science Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Prof. Dr. Tom Zimmermann
10	**Miscellaneous** Literature: Angrist and Pischke, "Mostly Harmless Econometrics"

CM Data Analytics V					
Module Code 1277MBDMA1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Data Management and Data Visualization		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Fundamentals of data storage, data cleansing and retrieval; data use and data quality for data analysis • Fundamentals of metadata; methods of data integration; data models and software architectures for the integration of different data types • Data management methods and practices (e.g. relational databases, SQL, NoSQL databases, data manipulation, access to data sources, Web APIs, scraping/crawling and parsing of text data) • Basics of data visualization (e.g. cognition, design principles for diagrams and graphics, visualization of different data types) • Methods and techniques of data visualization (e.g. tableau, R, dashboards, digital presentations)				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of programming and data analytics. ... analyse current questions and challenges in the field of programming and data analytics. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture practice				
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** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems				

	Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Core Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Arts Politikwissenschaft: Supplementary Section Political Science Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann
10	**Miscellaneous**

3.6.2 Specialisation Section

<table>
<tr><th colspan="7">SpM Digitalization and Data Analytics I</th></tr>
<tr><td colspan="2">Module Code
1277MSDDA1</td><td>Workload
180h</td><td>ECTS Credits
6</td><td>Module Language
English</td><td>Module Availability
every 2nd term - summer term</td><td>Duration
1 Term</td></tr>
<tr><td>1</td><td colspan="3">Courses
Digital Innovation and Digital Entrepreneurship</td><td>Contact Hours
45h</td><td>Self-Studies
135h</td><td>Course Language
English</td></tr>
<tr><td>2</td><td colspan="6">Module Content
• Foundations of digital innovation, digital entrepreneurship, and company startups
• Methods and concepts for setting up business models (especially data-driven) (e.g., business model canvas)
• Foundations of project management, agile methods (e.g. Scrum), and design thinking</td></tr>
<tr><td>3</td><td colspan="6">Learning Objectives
Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... understand advanced, specialized theories / methods in the field of innovation and entrepreneurship.
... analyse current questions and challenges in the field of innovation and entrepreneurship.
... assess and discuss findings and research results of specialized theories / methods.
... act responsibly considering ecological, social and ethical criteria.
... develop work processes for real problems and challenges.</td></tr>
<tr><td>4</td><td colspan="6">Teaching and Learning Methods
lecture
practice</td></tr>
<tr><td>5</td><td colspan="6">Module Entry Requirements
None</td></tr>
<tr><td>6</td><td colspan="6">Mode of End-Of-Module Examination
Combined examination: PRES, TP</td></tr>
<tr><td>7</td><td colspan="6">Prerequisites for Awarding of Credit Points
Passing the module examination.</td></tr>
<tr><td>8</td><td colspan="6">Other Programmes that Use the Module
Master of Science Business Analytics & Econometrics:
Specialication Section Business Analytics & Econometrics</td></tr>
<tr><td>9</td><td colspan="6">Module Manager
Prof. Dr. Mona Mensmann</td></tr>
<tr><td>10</td><td colspan="6">Miscellaneous</td></tr>
</table>

SpM Digitalization and Data Analytics II					
Module Code 1277MSDDA2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** Privacy and Ethics in a Digital World		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Fundamentals of data and business ethics • Concepts of data privacy (e.g. privacy by design), data ownership, data protection, regulation • Dealing with ethical issues in data analysis (e.g. algorithm ethics, surveillance capitalism)				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of privacy, data protection, and ethics. ... analyse current questions and challenges in the field of privacy, data protection, and ethics. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager** Prof. Dr. Mona Mensmann				
10	**Miscellaneous**				

SpM Capstone Project						
Module Code 1277MECDA1		**Workload** 360h	**ECTS Credits** 12	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** Capstone Project in Data Analytics			**Contact Hours** 90h	**Self-Studies** 270h	**Course Language** English
2	**Module Content** • Independent and autonomous execution of a data analysis project in a team within a project • Project and team management • Requirements analysis and design • Implementation, data collection and data analysis • Data presentation and visualization • Customer communication and management					
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... communicate continuously and purposefully in diverse teams. ... solve team-internal conflicts and target divergences independently. ... justify and defend (independently developed) positions or problem solutions. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... evaluate their own action processes in self- and external reflection and identify development potentials. ... act responsibly considering ecological, social and ethical criteria. ... critically evaluate current social developments and develop alternative solutions. ... develop work processes for real problems and challenges.					
4	**Teaching and Learning Methods** Research project					
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V, SpM Digitalization and Data Analytics I-II					
6	**Mode of End-Of-Module Examination** Portfolio: PO					
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.					
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics					
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann					

10	**Miscellaneous** Basic knowledge of programming, databases, modelling, data structures and algorithms as well as project management knowledge is required. Students work self-organized in teams. At set dates the teams have to present defined milestones (e.g. specification sheet, requirements specification, sprint meeting, backlogs, interim presentation, final presentation, finished end product including program code). The work results are compared and corrected if necessary, so that all teams are able to complete their project assignment. It is possible to work with companies from the field on concrete problems of data analysis.

SpM Analytics for Business I					
Module Code 1277MSAFB1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Bayesian Data Analytics		**Contact Hours** 60h	**Self-Studies** 120h	**Course Language** English
2	**Module Content** • The course on Bayesian Data Analytics provides a broad introduction to the concept of Bayesian statistics and modeling. • Topics: model building and evaluation, MCMC simulation, generalized linear models, binomial/Poisson regression, and multilevel models. • The course will also discuss recent Bayesian data projects, and students will learn to set up their Bayesian projects using R.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the area of Bayesian Data Analytics. ... analyse current questions and challenges in the area of Bayesian Data Analytics. ... assess and discuss findings and research results of specialized theories / methods. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... act responsibly considering ecological, social and ethical criteria.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann				
10	**Miscellaneous**				

<table>
<tr><th colspan="7">SpM Analytics for Business II</th></tr>
<tr><td colspan="2">Module Code
1277MSAFB2</td><td>Workload
180h</td><td>ECTS Credits
6</td><td>Module Language
English</td><td>Module Availability
every 2nd term - winter term</td><td>Duration
1 Term</td></tr>
<tr><td>1</td><td colspan="3">Courses
Advanced Data Analytics for Business</td><td>Contact Hours
30h</td><td>Self-Studies
150h</td><td>Course Language
English</td></tr>
<tr><td>2</td><td colspan="6">Module Content
In the course, we disuss latest methods and rearch results based on recent research papers
• Advanced methods for data analysis of business data; alternating topics based on real research projects, e.g.:
• Ensemble methods
• Social media and network analysis
• Text analytics, text mining, NLP
• Neural Nets
• Heterogeneous Treatment Effects
• Multi-Armed Bandits</td></tr>
<tr><td>3</td><td colspan="6">Learning Objectives
Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... understand advanced, specialized theories / methods in the field of data analytics for business.
... analyse current questions and challenges in the field of data analytics for business.
... assess and discuss findings and research results of specialized theories / methods.
... act responsibly considering ecological, social and ethical criteria.
... develop work processes for real problems and challenges.</td></tr>
<tr><td>4</td><td colspan="6">Teaching and Learning Methods
lecture
practice</td></tr>
<tr><td>5</td><td colspan="6">Module Entry Requirements
Recommendation: CM Data Analytics I-V</td></tr>
<tr><td>6</td><td colspan="6">Mode of End-Of-Module Examination
Written test: PO</td></tr>
<tr><td>7</td><td colspan="6">Prerequisites for Awarding of Credit Points
Passing the module examination.</td></tr>
<tr><td>8</td><td colspan="6">Other Programmes that Use the Module
Master of Science Business Analytics & Econometrics:
Specialication Section Business Analytics & Econometrics
Supplementary Section Business Analytics & Econometrics</td></tr>
<tr><td>9</td><td colspan="6">Module Manager
Jun. Prof. Dr. Ziyue Li</td></tr>
</table>

10	**Miscellaneous** Literature: McElreath (2021): Statistical Rethinking. CRC Press

SpM Analytics for Business III					
Module Code 1277MSAFB3	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Digital Strategy and Digital Transformation		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Digital business strategies, fusion of business and IT • Data-driven business models, Digital platform business • Digital business transformation (e.g. change management, team management)				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of strateggy and digital transformation. ... analyse current questions and challenges in the field of strateggy and digital transformation. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Prof. Dr. Mona Mensmann				
10	**Miscellaneous**				

SpM Seminar Data Analytics for Business					
Module Code 1277MSSDB1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every term	**Duration** 1 Term
1	**Courses** a) Seminar Data Analytics for Business I b) Seminar Data Analytics for Business II c) Seminar Data Analytics for Business III		**Contact Hours** a) 30h b) 30h c) 30h	**Self-Studies** a) 150h b) 150h c) 150h	**Course Language** a) English b) English c) English
2	**Module Content** Selected issues and varying topics in the area of data analytics for business.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... assess and discuss findings and research results of specialized theories / methods. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... collect, systematize and synthesize independently literature on selected scientific questions. ... justify and defend (independently developed) positions or problem solutions. ... evaluate their own action processes in self- and external reflection and identify development potentials. ... critically evaluate current social developments and develop alternative solutions. ... use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** seminar				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V; SpM Digitalization and Data Analytics I-II				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination of one course. A course is to be attended; the examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Prof. Dr. Mona Mensmann				
10	**Miscellaneous** Delivery and discussion of presentations, prepared in the form of written papers under guidance. Students will generally be advised of compulsory reading and the topics for the presentations towards the end of the preceding term. Which topics are to be assigned to which students is decided				

	after they have been advised of the topics available, towards the end of the preceding term. To enhance the learning outcome and expand the creative component, the advanced seminar can also be project-based or in the style of a case study. In these cases, a specifically defined assignment is given in addition to the compulsory reading. The written paper and the presentation then report on the approaches taken when attempting to answer the question or solve the task on the literature and the students' own work.

Studies Abroad in Business Analytics I					
Module Code 1277MSSAB1	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Business Analytics				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods** depending on course choice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depending on course choice				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager** Programmdirektor:in				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

Studies Abroad in Business Analytics II					
Module Code 1277MSSAB2	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Business Analytics				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods** depending on course choice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depending on course choice				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager** Programmdirektor:in				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

Studies Abroad in Business Analytics III					
Module Code 1277MSSAB3	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Business Analytics				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods** depending on course choice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depending on course choice				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager**				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

SpM Empirical Methods and Data Analysis I					
Module Code 1314MSEMD1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** a) Probability and Statistical Inference b) Topics in Econometrics and Statistics I		**Contact Hours** a) 45h b) 45h	**Self-Studies** a) 135h b) 135h	**Course Language** a) English b) English
2	**Module Content** • Foundations of probability theory • Theory of point estimation and estimation techniques (e.g. maximum likelihood) • Theory of hypothesis testing and selected tests • Interval estimation				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialised theories / methods.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: solid basic knowledge of probability theory				
6	**Mode of End-Of-Module Examination** Written test: WT (90)				
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management				

	Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Business Administration - Marketing: Core Section Marketing Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Dominik Wied
10	**Miscellaneous**

SpM Empirical Methods and Data Analysis II					
Module Code 1314MSEMD2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** a) Microeconometrics b) Machine Learning for Economists c) Topics in Econometrics and Statistics II		**Contact Hours** a) 45h b) 45h c) 45h	**Self-Studies** a) 135h b) 135h c) 135h	**Course Language** a) English c) English
2	**Module Content** • Limited dependent variables • Evaluation of treatment effects • Duration analysis • Panel data and factor models				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** lecture				
5	**Module Entry Requirements** Recommendation: CM Econometrics or CM Applied Econometrics (Business Administration) or CM Advanced Econometrics				
6	**Mode of End-Of-Module Examination** Written test: WT (60)				
7	**Prerequisites for Awarding of Credit Points** Passing the examination. One course is to be attended; the examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing:				

	Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Jörg Breitung
10	**Miscellaneous**

SpM Empirical Methods and Data Analysis IV					
Module Code 1314MSEMD4	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** a) Statistical Analysis of Financial Data b) Topics in Econometrics and Statistics IV		**Contact Hours** a) 45h b) 45h	**Self-Studies** a) 135h b) 135h	**Course Language** a) English b) English
2	**Module Content** • Properties of financial time series • Time series models • Efficiency of financial markets • Empirical analysis of the capital asset pricing model • Empirical analysis of intertemporal asset pricing models • Volatility models • Market Microstructure and high-frequency data				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... justify and defend (independently developed) positions or problem solutions.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: Solid knowledge of statistical and econometric methods; CM Econometrics or CM Applied Econometrics (Business Administration) or CM Advanced Econometrics				
6	**Mode of End-Of-Module Examination** Written test: WT (90)				
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Core Section Accounting and Taxation Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance:				

	Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Business Administration - Finance: Core Section Finance Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Roman Liesenfeld
10	**Miscellaneous**

SpM Seminar in Statistics and Econometrics					
Module Code 1287MESEC2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Seminar in Statistics and Econometrics		**Contact Hours** 30h	**Self-Studies** 150h	**Course Language** English
2	**Module Content** Independent work on a current research topic in econometrics or statistics.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ...independently collect, systematize and synthesize literature on selected scientific questions. ...write an academic paper on a selected topic and thereby achieve their own scientific contribution. ...present scientific results in a way that is appropriate for the target audience. ...independently use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** seminar				
5	**Module Entry Requirements** Advanced knowledge in the areas of statistics an econometrics				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Fachbereich Ökonometrie und Statistik				
10	**Miscellaneous**				

Studies Abroad in Econometrics I					
Module Code 1314MSSAE1	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Econometrics				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods** depending on course choice				
5	**Module Entry Requirements** depending on course choice				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depending on course choice				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager**				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

Studies Abroad in Econometrics II					
Module Code 1314MSSAE2	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Econometrics				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods** depending on course choice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depending on course choice				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager** Programmdirektor:in				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

Studies Abroad in Econometrics III					
Module Code 1314MSSAE3	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Econometrics				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods** depending on course choice				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depending on course choice				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics				
9	**Module Manager** Programmdirektor:in				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

3.6.3 Supplementary Section

SpM Empirical Methods and Data Analysis I					
Module Code 1314MSEMD1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** a) Probability and Statistical Inference b) Topics in Econometrics and Statistics I		**Contact Hours** a) 45h b) 45h	**Self-Studies** a) 135h b) 135h	**Course Language** a) English b) English
2	**Module Content** • Foundations of probability theory • Theory of point estimation and estimation techniques (e.g. maximum likelihood) • Theory of hypothesis testing and selected tests • Interval estimation				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialised theories / methods.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: solid basic knowledge of probability theory				
6	**Mode of End-Of-Module Examination** Written test: WT (90)				
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development:				

	Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Business Administration - Marketing: Core Section Marketing Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Dominik Wied
10	**Miscellaneous**

SpM Empirical Methods and Data Analysis II					
Module Code 1314MSEMD2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** a) Microeconometrics b) Machine Learning for Economists c) Topics in Econometrics and Statistics II		**Contact Hours** a) 45h b) 45h c) 45h	**Self-Studies** a) 135h b) 135h c) 135h	**Course Language** a) English c) English
2	**Module Content** • Limited dependent variables • Evaluation of treatment effects • Duration analysis • Panel data and factor models				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** lecture				
5	**Module Entry Requirements** Recommendation: CM Econometrics or CM Applied Econometrics (Business Administration) or CM Advanced Econometrics				
6	**Mode of End-Of-Module Examination** Written test: WT (60)				
7	**Prerequisites for Awarding of Credit Points** Passing the examination. One course is to be attended; the examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing:				

	Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Jörg Breitung
10	**Miscellaneous**

SpM Empirical Methods and Data Analysis III					
Module Code 1314MSEMD3	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** a) Time Series Econometrics b) Stochastic Models and Processes c) Topics in Econometrics and Statistics III		**Contact Hours** a) 45h b) 45h c) 45h	**Self-Studies** a) 135h b) 135h c) 135h	**Course Language** a) English b) English c) English
2	**Module Content** a)Time Series Econometrics: • ARMA Models • State-Space Models • Models for Non-Stationary Time Series • Multivariate Time Series Models • Non-Stationarity in Multivariate Time Series b) Stochastic Models and Processes: • Deepening topics in statistical inference • bootstrap • nonparametric density estimation • nonparametric tests (e.g. for independence) • Brownian motions • Poisson processes • Markov processes				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: Solid basic knowledge of probability theory				
6	**Mode of End-Of-Module Examination** Written test: WT (90)				
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik:				

	Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Business Administration - Marketing: Core Section Marketing Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Dominik Wied
10	**Miscellaneous**

SpM Empirical Methods and Data Analysis IV					
Module Code 1314MSEMD4	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** a) Statistical Analysis of Financial Data b) Topics in Econometrics and Statistics IV		**Contact Hours** a) 45h b) 45h	**Self-Studies** a) 135h b) 135h	**Course Language** a) English b) English
2	**Module Content** • Properties of financial time series • Time series models • Efficiency of financial markets • Empirical analysis of the capital asset pricing model • Empirical analysis of intertemporal asset pricing models • Volatility models • Market Microstructure and high-frequency data				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... justify and defend (independently developed) positions or problem solutions.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: Solid knowledge of statistical and econometric methods; CM Econometrics or CM Applied Econometrics (Business Administration) or CM Advanced Econometrics				
6	**Mode of End-Of-Module Examination** Written test: WT (90)				
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Core Section Accounting and Taxation Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance:				

	Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Business Administration - Finance: Core Section Finance Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Univ.-Prof. Dr. Roman Liesenfeld
10	**Miscellaneous**

SpM Empirical Methods and Data Analysis V					
Module Code 1314MSEMD5	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** a) Multivariate Statistics b) Panel Data Analysis c) Bayesian Econometrics d) Topics in Econometrics and Statistics V		**Contact Hours** a) 45h b) 45h c) 45h d) 45h	**Self-Studies** a) 135h b) 135h c) 135h d) 135h	**Course Language** a) English b) English c) English d) English
2	**Module Content** a) Multivariate Statistics: • Analysis of Variance • Eigenvalues • Principal Component Analysis • Factor Analysis • Discriminant Analysis • Cluster Analysis • Multivariate Testing • Correlation Analysis b) Panel Data Analysis: • Static Panel Data Model • Dynamic Panel Data Model • Extensions • Factor Analysis c) Bayesian Econometrics: • Basic Principles of Bayesian Econometrics • Bayesian Estimators and Numerical Integration • Importance Sampling and Markov-Chain-Monte-Carlo • Gaussian Linear Regression Model with Conjugate Priors • Gaussian Linear Regression Model with Non-Conjugate Priors • Linear Regression Model with General Error Covariance Matrix • Time Series Models • Models for discrete dependent variables • Students will practice the use of the methods using econometric software to analyse economic data d) Topics in Econometrics and Statistics 5: • Recent statistical and econometric methods • Applications in business administration, management studies and economics and social sciences					
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized methods in Statistics and Econometrics. ... analyse current questions and challenges in Statistics and Econometrics. ... analyse data material for selected scientific questions using statistical and econometric methods. ... justify and defend (independently developed) positions or problem solutions.				

	... discuss scientific topics in a professional manner and appropriate to the situation with specialists. ... use techniques of scientific work and good scientific practice.
4	**Teaching and Learning Methods** lecture practice
5	**Module Entry Requirements** Recommendation: CM Econometrics or CM Applied Econometrics (Business Administration) or CM Advanced Econometrics
6	**Mode of End-Of-Module Examination** Oral examination: OE
7	**Prerequisites for Awarding of Credit Points** Passing the oral examination of one course. A course is to be attended; the oral examination relates to the content of one course.
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Master of Science Wirtschaftsmathematik: Economics Master of Science Business Administration - Accounting and Taxation: Core Section Accounting and Taxation Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Economics: Specialisation Section Economics Supplementary Section Economics Master of Science Business Administration - Finance: Core Section Finance Master of Science Economic Research: Supplementary Section Economic Research Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Economic Research: Specialisation Section Economic Research
9	**Module Manager** Dr. Bastian Gribisch

10	**Miscellaneous**

<table>
<tr><th colspan="6">SpM Information Systems I</th></tr>
<tr><td colspan="2">Module Code
1277MSISY1</td><td>Workload
180h</td><td>ECTS Credits
6</td><td>Module Language
English</td><td>Module Availability
every term</td><td>Duration
1 Term</td></tr>
<tr><td>1</td><td colspan="3">Courses
a) Advanced Analytics and Applications
b) Sustainable Digital Innovation Lab
c) Case Project Digital Transformation</td><td>Contact Hours
a) 30h
b) 30h
c) 30h</td><td>Self-Studies
a) 150h
b) 150h
c) 150h</td><td>Course Language
a) English
b) English
c) English</td></tr>
<tr><td>2</td><td colspan="6">Module Content
a) Advanced Analytics and Applications
• Business analytics applications
• Information quality
• Explanatory analytics
• Predictive analytics
• Data mining process
• Predictive models
• Classification methods
• Clustering and data reduction methods
• Gaussian Mixture models
• Sampling methods
• Neural networks and Deep learning
• Time Series
• Causal inference
• Identification of Treatment Effects
• Ensemble Learning
• Introduction to Reinforcement Learning
• Programming Language: Python

b) Sustainable Digital Innovation Lab
• Introduction to global sustainability challenges and digital innovation
• Emergent digital technology stacks (hardware and software)
• Systems development practices suitable for complex contexts and requirements
• Development of ideas to solve the design challenge
• Project and team management
• Design and implementation of information systems
• Prototyping and testing

c) Case Project Digital Transformation
• Digital Strategy Lab
• Digital Strategy Ideation (Design Thinking)
• Digital Strategy Development
• Digital Transformation (Development of a Technical Solution / Use-Case / Prototype based on the Developed Strategy)</td></tr>
<tr><td>3</td><td colspan="6">Learning Objectives
Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.
... analyse current questions and challenges in the areas of: (a) Data Science and Machine Learning, (b) digital innovation, digital technologies, systems development, sustainability, (c) digital strategy and innovation.
... solve team-internal conflicts and target divergences independently.</td></tr>
</table>

	... present scientific results in a way that is appropriate for the target audience. ... critically evaluate current social developments and develop alternative solutions. ... develop work processes for real problems and challenges.
4	**Teaching and Learning Methods** lecture practice
5	**Module Entry Requirements** none
6	**Mode of End-Of-Module Examination** Written test: PO
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.
8	**Other Programmes that Use the Module** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik Master of Science Information Systems: Specialisation Section Information Systems
9	**Module Manager** Univ.-Prof. Dr. Wolf Ketter
10	**Miscellaneous**

SpM Information Systems II					
Module Code 1277MSISY2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every term	**Duration** 1 Term
1	**Courses** a) Emerging Electronic Business b) Business Intelligence and Data Management c) IT Entrepreneurship d) Bayesian Data Analytics		**Contact Hours** a) 45h b) 50h c) 50h d) 45h	**Self-Studies** a) 135h b) 130h c) 130h d) 135h	**Course Language** a) English b) English c) English d) English
2	**Module Content** a) Emerging Electronic Business • Current IT trends and the transformation of electronic business into ""ambient business"" in the context of networked and computerised objects and environments (Internet of Things, smart Environments) • Conceptual basics of relevant technologies (including sensors, RFID, telecommunication) • Design and applications of smart environments • Design of intuitive human-computer interaction (HCI) • Context awareness and context-based services • Freely offering and sharing Information as a way of adding value • Economic, social and ethical effects of increasingly omnipresent information technology b) Business Intelligence and Data Management • Reporting and Online Analytical Processing (OLAP) • Multidimensional Data Modelling (e.g., MetaMIS, ADAPT) • Design and implementation of data warehouses • Data warehouse schemas and architectures • Non-relational databases (NoSQL/NewSQL) • Foundations of managing and analysing large data sets (e.g., Spark, Hadoop, MapReduce) • Data mining and business analytics (association rules, decision trees, clustering, artificial neural networks) c) IT Entrepreneurship • Fundamentals of entrepreneurship • Forms of entrepreneurship • Process models of entrepreneurship • IT-centered start-up industries • Digital technologies as enablers and triggers of entrepreneurship • Practices for developing and presenting start-up ideas d) Bayesian Data Analytics • Advanced methods for data analysis of business data; alternating topics based on real research projects, e.g.: • Ensemble methods • Social media and network analysis • Text analytics, text mining, NLP • Neural Nets • Heterogeneous Treatment Effects • Multi-Armed Bandits				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under				

	„Module content“. ... analyse current questions and challenges: ... a) in the area of latest technical and business-related developments in (emerging) electronic businesses. ... b) in data analytics, data warehousing, and data mining. ... c) in IT-centric entrepreneurship ... d) in data analysis for entrepreneurs. ... act responsibly considering ecological, social and ethical criteria. ... critically evaluate current social developments and develop alternative solutions. ... develop work processes for real problems and challenges.
4	**Teaching and Learning Methods** lecture practice
5	**Module Entry Requirements** none
6	**Mode of End-Of-Module Examination** Written test: PO
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.
8	**Other Programmes that Use the Module** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik Master of Science Information Systems: Specialisation Section Information Systems
9	**Module Manager** Univ.-Prof. Dr. Christoph Rosenkranz
10	**Miscellaneous** a) Lecture is held in a project-based style. Students develop application scenarios and/ or prototypes for emerging electronic business, implement them, and present them in class. b) The course will employ a project-based format. c) Required readings are announced at the beginning of the semester.

<table>
<tr><th colspan="6">SpM Information Systems III</th></tr>
<tr><td colspan="2">Module Code
1277MSISY3</td><td>Workload
180h</td><td>ECTS Credits
6</td><td>Module Language
English</td><td>Module Availability
every term</td><td>Duration
1 Term</td></tr>
<tr><td>1</td><td colspan="2">Courses
a) Artificial Intelligence and Information Management
b) Machine Learning and Artificial Intelligence
c) Applied Mathematical Optimization
d) Decision Making under Uncertainty</td><td>Contact Hours
a) 50h
b) 60h
c) 50h
d) 30h</td><td>Self-Studies
a) 130h
b) 120h
c) 130h
d) 150h</td><td>Course Language
a) English
b) English
c) English
d) English</td></tr>
<tr><td>2</td><td colspan="6">Module Content
a) Artificial Intelligence and Information Management
• Concepts, frameworks, and development of Information Management
• Management of external information sources and demand
• IT in companies - role and contribution to value generation
• IT Governance
• IT Strategy and Strategic Alignment
• IT Processes
• IT Controlling
• IT Sourcing
• Knowledge Management
• Role of the CIO
• New trends

b) Applied Mathematical Optimization
• Fundamentals of Sustainable Information Systems
• Domain Knowledge in Energy and Mobility in conjunction with sustainability
• Data Science and Machine Learning Methods
• Introduction to wicked problems and how to tackle them with Data Science
• Simulation and experimentation techniques
• Cutting-Edge IS use cases from practice and leading research

c) Machine Learning and Artificial Intelligence
• Basics oft he methods of Machine Learning and Artificial Intelligence (AI)
• Basics of both supervised and unsupervised methods (e.g. decision trees, random forests, boosting, support vector machines, neural networks, deep and opponent learning, ensemble learning, principal component analysis, factor analysis and diverse learning or multidimensional scaling)
• Translation of business problems into machine learning use cases; feasibility and impact
• Responsible implementation of machine learning projects in compliance with ethical standards

d) Decision Making under Uncertainty
• Probabilistics
• Bayesian Networks
• (Hidden) Markov Decision Process
• Dynamic Programming
• Forecasting and Time-SeriesPrognose und Zeitreihenanalyse
• Agent-based Decision and Reinforcement Learning</td></tr>
<tr><td>3</td><td colspan="6">Learning Objectives
Students...
... know and understand the relevant methods and theories for the points mentioned above under „Module content“.</td></tr>
</table>

	... communicate continuously and purposefully in diverse teams. ... solve team-internal conflicts and target divergences independently. ... justify and defend (independently developed) positions or problem solutions. ... evaluate their own action processes in self- and external reflection and identify development potentials. ... develop work processes for real problems and challenges.
4	**Teaching and Learning Methods** lecture practice
5	**Module Entry Requirements** none
6	**Mode of End-Of-Module Examination** Written test: PO
7	**Prerequisites for Awarding of Credit Points** Passing the written examination of one course. A course is to be attended; the written examination relates to the content of one course.
8	**Other Programmes that Use the Module** Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik Master of Science Information Systems: Specialisation Section Information Systems
9	**Module Manager** Univ.-Prof. Dr. Wolf Ketter
10	**Miscellaneous** b) Required readings are announced at the beginning of the semester.

SpM Marketing Performance Management					
Module Code 1266MSMPF1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Marketing Performance Management		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** The module deals with central questions of marketing performance management and includes conceptual and applied elements, including presentations by guest speakers and discussions from the world of marketing. Students are required to organise their own learning and working processes independently and self-responsibly in addition to attending lectures and participating in exercises. In addition, it is expected that students read the related literature.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... analyse current questions and challenges that arise when quantifying and evaluating marketing activities in financial terms. ... assess and discuss findings and research results of specialised marketing theories, concepts, and methods in the domain of marketing performance management. ... act responsibly considering ecological, social and ethical criteria.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: basic knowledge of marketing and multivariate methods				
6	**Mode of End-Of-Module Examination** Written test: WT (60)				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Sciences Master of Science Wirtschaftsmathematik: Economics Sciences Master of Science Business Administration - Accounting and Taxation: Supplementary Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management:				

	Supplementary Section Supply Chain Management Master of Science Geographie: Wahlpflichtfach Management & Social Sciences Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Business Administration - Marketing: Specialisation Section Marketing Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik Master of Arts Medienwissenschaft: Ergänzungsbereich Medienmanagement und Medienökonomie Master of Arts Regionalstudien China - Betriebswirtschaftslehre: Ergänzungsbereich Business Administration
9	**Module Manager** Univ.-Prof. Dr. Marc Fischer
10	**Miscellaneous** This module may consist of at least one course that takes place either until the middle of the semester (1. term) or from the middle of the semester onwards (2. term). You can find this information in the KLIPS entry of the corresponding course. The corresponding examinations of courses that take place in the 1. term are often offered in the middle of the semester.

SpM Business Project					
Module Code 1266MSBPR1	**Workload** 360h	**ECTS Credits** 12	**Module Language** English	**Module Availability** every term	**Duration** 1 Term
1	**Courses** a) Business Project in Marketing b) Applied Research Project in Marketing		**Contact Hours** a) 30h b) 30h	**Self-Studies** a) 330h b) 330h	**Course Language** a) English b) English
2	**Module Content** The module includes conceptual and applied elements, including presentations by the students, case studies, discussions and guest speakers from industry. Students work on real-world problems for which they then present solutions using the skills and knowledge they have acquired during the program. Students are required to do their own reading independently in addition to attending working sessions.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... collect, systematize and synthesize independently literature on selected scientific questions. ... communicate continuously and purposefully in diverse teams. ... justify and defend (independently developed) positions or problem solutions. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** seminar Research project				
5	**Module Entry Requirements** Recommendation: Basic knowledge in marketing				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the combined examination. A course is to be attended; the examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science Business Administration - Marketing: Specialisation Section Marketing				
9	**Module Manager** Area Marketing				
10	**Miscellaneous**				

SpM Controlling I						
Module Code 1016MSCON1		**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Operative Controlling (1. Term)			**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Fundamentals of controlling • Theory, strategies and methods to support controlling activities • Controlling instruments					
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the area of operative controlling. ... communicate continuously and purposefully in diverse teams. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... develop work processes for real problems and challenges.					
4	**Teaching and Learning Methods** lecture practice					
5	**Module Entry Requirements** Recommendation: Basic knowledge of internal and external accounting, investment, financing and decision theory					
6	**Mode of End-Of-Module Examination** Written test: WT (60)					
7	**Prerequisites for Awarding of Credit Points** Passing the module examination					
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Sciences Master of Science Wirtschaftsmathematik: Economics Sciences Master of Science Business Administration - Accounting and Taxation: Specialisation Section Accounting and Taxation Master of Science Geographie: Wahlpflichtfach Management & Social Sciences Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research					

	Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Gesundheitsökonomie: Supplementary Section Health Economics Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik Master of Arts Regionalstudien China - Betriebswirtschaftslehre: Ergänzungsbereich Business Administration
9	**Module Manager** Univ.-Prof. Dr. Carsten Homburg
10	**Miscellaneous** This course ends in the middle of the semester (1. term). The exam is offered at the end of the course.

SpM Controlling II					
Module Code 1016MSCON2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Strategic Controlling (2. Term)		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Introduction to strategic controlling • Conventional cost management instruments • More recent cost management instruments • Benchmarking				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the area of strategic controlling. ... communicate continuously and purposefully in diverse teams. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: Basic knowledge of internal and external accounting, investment, financing and decision theory				
6	**Mode of End-Of-Module Examination** Written test: WT (60)				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Sciences Master of Science Wirtschaftsmathematik: Economics Sciences Master of Science Business Administration - Accounting and Taxation: Specialisation Section Accounting and Taxation Master of Science Economics: Supplementary Section Management & Social Sciences Master of Science Sociology: Social and Economic Psychology: Supplementary Section Sociology: Social and Economic Psychology Master of Science Sociology: Social Research: Supplementary Section Sociology and Social Research Master of Science Business Administration - Finance:				

	Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Gesundheitsökonomie: Supplementary Section Health Economics Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik
9	**Module Manager** Univ.-Prof. Dr. Carsten Homburg
10	**Miscellaneous** This course starts in the middle of the semester (2. term). The exam is offered at the end of the course.

SpM Advanced Accounting					
Module Code 1016MSAAC1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** Value-based Controlling		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Basics of value-based controlling (including traditional financial indicators) • Characteristics of capital markets • Effect of capital structure on business value • Shareholder value approach • Discounted cash flow (DCF) method • Value-based indicators and their steering • Working capital management, especially cash management • Risk measurement and risk management • Implementation of a value-based strategy • The Ohlson model				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... collect, systematize and synthesize independently literature on selected scientific questions. ... justify and defend (independently developed) positions or problem solutions. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... act responsibly considering ecological, social and ethical criteria. ... critically evaluate current social developments and develop alternative solutions.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: Basic knowledge of internal and external accounting, investment and financing				
6	**Mode of End-Of-Module Examination** Written test: WT (60)				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Mathematik: Economics Sciences Master of Science Wirtschaftsmathematik: Economics Sciences Master of Science Business Administration - Accounting and Taxation:				

	Specialisation Section Accounting and Taxation Master of Science Business Administration - Finance: Supplementary Section Finance Master of Science Business Administration - Marketing: Supplementary Section Marketing Master of Science Information Systems: Supplementary Section Information Systems Master of Science Business Administration - Corporate Development: Supplementary Section Corporate Development Master of Science Business Administration - Supply Chain Management: Supplementary Section Supply Chain Management Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science International Management: Supplementary Section International Management Master of Science Informatik: Anwendungsfeld Master of Science Gesundheitsökonomie: Supplementary Section Health Economics Master of Education Wirtschaftspädagogik/Lehramt an Berufskollegs: Ergänzungbereich Wirtschaftspädagogik
9	**Module Manager** Univ.-Prof. Dr. Carsten Homburg
10	**Miscellaneous**

CM People Analytics & Econometrics					
Module Code 1253MBPAE1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** People Analytics & Econometrics		**Contact Hours** 60h	**Self-Studies** 120h	**Course Language** English
2	**Module Content** The modules trains students to analyze company data using statistical software in order to evaluate the impact of management practices.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods. ... analyse current questions and challenges. ... assess and discuss findings and research results of specialized theories / methods. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... evaluate their own action processes in self- and external reflection and identify development potentials. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges. ... use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: Basic knowledge of statistics				
6	**Mode of End-Of-Module Examination** Project Paper				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science Business Administration - Corporate Development: Core Section Corporate Development				
9	**Module Manager** Univ.-Prof. Dr. Dirk Sliwka				

10	**Miscellaneous**

CM Advanced Econometrics I					
Module Code 1314MBAEM1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Advanced Econometrics: Theory		**Contact Hours** 60h	**Self-Studies** 120h	**Course Language** English
2	**Module Content** • The classic linear model • Tests in the classical linear model • Specification of econometric models • Generalised linear model • Panel data regression • Time series econometric methods • Instrument Variables / GMM • Asymptotic Inference				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... have basic knowledge of econometric methods, which enable them to understand scientific contributions in the field of empirical economic research and to assess the properties of quantitative methods. ... model economic relationships econometrically and choose between alternative model specifications. ... estimate parameters with suitable methods and carry out hypothesis tests.				
4	**Teaching and Learning Methods** lecture practice				
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 module examination				
8	**Other Programmes that Use the Module** Master of Science Economic Research: Core Section Economic Research Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science Economic Research: Specialisation Section Economic Research				

9	**Module Manager** Univ.-Prof. Dr. Jörg Breitung
10	**Miscellaneous** This module presents econometric tools for the analysis of cross-sectional data, time series and panel data at doctoral level.

CM Advanced Econometrics II					
Module Code 1314MBAEM2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** Advanced Econometrics: Applications		**Contact Hours** 60h	**Self-Studies** 120h	**Course Language** English
2	**Module Content** • Evaluation of causal effects • Fixed effects and difference-in-difference estimator • Regression discontinuity designs • Robust standard errors and clustering • Structural estimates with experimental data				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... implement estimation methods and test procedures. ... discuss situation estimation and testing procedures. ... apply appropriate econometric models and the corresponding inference methods. ... carry out empirical studies in modern macro- and microeconometrics. ... report on their approach and their results.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** none				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Economic Research: Core Section Economic Research Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics Master of Science Economic Research: Specialisation Section Economic Research				
9	**Module Manager** Univ.-Prof. Dr. Jörg Breitung				

10	**Miscellaneous** This module presents econometric tools for the analysis of cross-sectional data, time series and panel data at doctoral level.

SpM Seminar Empirical Methods and Data Analysis					
Module Code 1314MSSEM1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - summer term	**Duration** 1 Term
1	**Courses** Seminar Empirical Methods and Data Analysis		**Contact Hours** 30h	**Self-Studies** 150h	**Course Language** English
2	**Module Content** Independent work on a current topic in econometrics and statistics (from the fields of financial, micro and time series econometrics as well as statistical learning)				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... collect, systematize and synthesize independently literature on selected scientific questions. ... write an academic paper on a selected topic and achieve thereby their own scientific contribution. ... present scientific results in a way that is appropriate for the target audience.				
4	**Teaching and Learning Methods** seminar				
5	**Module Entry Requirements** Recommendation: Knowledge from specialized modules in econometrics and statistics				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Economics: Specialisation Section Economics Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Fachbereich Ökonometrie und Statistik				
10	**Miscellaneous**				

SpM Analytics for Business I					
Module Code 1277MSAFB1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Bayesian Data Analytics		**Contact Hours** 60h	**Self-Studies** 120h	**Course Language** English
2	**Module Content** • The course on Bayesian Data Analytics provides a broad introduction to the concept of Bayesian statistics and modeling. • Topics: model building and evaluation, MCMC simulation, generalized linear models, binomial/Poisson regression, and multilevel models. • The course will also discuss recent Bayesian data projects, and students will learn to set up their Bayesian projects using R.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the area of Bayesian Data Analytics. ... analyse current questions and challenges in the area of Bayesian Data Analytics. ... assess and discuss findings and research results of specialized theories / methods. ... discuss scientific topics in a professional manner and appropriate to the situation with (non-) specialists. ... act responsibly considering ecological, social and ethical criteria.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann				
10	**Miscellaneous**				

SpM Analytics for Business II					
Module Code 1277MSAFB2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Advanced Data Analytics for Business		**Contact Hours** 30h	**Self-Studies** 150h	**Course Language** English
2	**Module Content** In the course, we disuss latest methods and rearch results based on recent research papers • Advanced methods for data analysis of business data; alternating topics based on real research projects, e.g.: • Ensemble methods • Social media and network analysis • Text analytics, text mining, NLP • Neural Nets • Heterogeneous Treatment Effects • Multi-Armed Bandits				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of data analytics for business. ... analyse current questions and challenges in the field of data analytics for business. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture practice				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann				

10	**Miscellaneous** Literature: McElreath (2021): Statistical Rethinking. CRC Press

SpM Analytics for Business III					
Module Code 1277MSAFB3	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Digital Strategy and Digital Transformation		**Contact Hours** 45h	**Self-Studies** 135h	**Course Language** English
2	**Module Content** • Digital business strategies, fusion of business and IT • Data-driven business models, Digital platform business • Digital business transformation (e.g. change management, team management)				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... understand advanced, specialized theories / methods in the field of strateggy and digital transformation. ... analyse current questions and challenges in the field of strateggy and digital transformation. ... assess and discuss findings and research results of specialized theories / methods. ... act responsibly considering ecological, social and ethical criteria. ... develop work processes for real problems and challenges.				
4	**Teaching and Learning Methods** lecture				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V				
6	**Mode of End-Of-Module Examination** Written test: PO				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann				
10	**Miscellaneous**				

SpM Seminar in Statistics and Econometrics					
Module Code 1287MESEC2	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every 2nd term - winter term	**Duration** 1 Term
1	**Courses** Seminar in Statistics and Econometrics		**Contact Hours** 30h	**Self-Studies** 150h	**Course Language** English
2	**Module Content** Independent work on a current research topic in econometrics or statistics.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ...independently collect, systematize and synthesize literature on selected scientific questions. ...write an academic paper on a selected topic and thereby achieve their own scientific contribution. ...present scientific results in a way that is appropriate for the target audience. ...independently use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** seminar				
5	**Module Entry Requirements** Advanced knowledge in the areas of statistics an econometrics				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Fachbereich Ökonometrie und Statistik				
10	**Miscellaneous**				

SpM Seminar Data Analytics for Business					
Module Code 1277MSSDB1	**Workload** 180h	**ECTS Credits** 6	**Module Language** English	**Module Availability** every term	**Duration** 1 Term
1	**Courses** a) Seminar Data Analytics for Business I b) Seminar Data Analytics for Business II c) Seminar Data Analytics for Business III		**Contact Hours** a) 30h b) 30h c) 30h	**Self-Studies** a) 150h b) 150h c) 150h	**Course Language** a) English b) English c) English
2	**Module Content** Selected issues and varying topics in the area of data analytics for business.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... assess and discuss findings and research results of specialized theories / methods. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... collect, systematize and synthesize independently literature on selected scientific questions. ... justify and defend (independently developed) positions or problem solutions. ... evaluate their own action processes in self- and external reflection and identify development potentials. ... critically evaluate current social developments and develop alternative solutions. ... use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** seminar				
5	**Module Entry Requirements** Recommendation: CM Data Analytics I-V; SpM Digitalization and Data Analytics I-II				
6	**Mode of End-Of-Module Examination** Combined examination: PRES, TP				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination of one course. A course is to be attended; the examination relates to the content of one course.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Specialication Section Business Analytics & Econometrics Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Univ.-Prof. Dr. Markus Weinmann				
10	**Miscellaneous** Delivery and discussion of presentations, prepared in the form of written papers under guidance. Students will generally be advised of compulsory reading and the topics for the presentations towards the end of the preceding term. Which topics are to be assigned to which students is decided				

	after they have been advised of the topics available, towards the end of the preceding term. To enhance the learning outcome and expand the creative component, the advanced seminar can also be project-based or in the style of a case study. In these cases, a specifically defined assignment is given in addition to the compulsory reading. The written paper and the presentation then report on the approaches taken when attempting to answer the question or solve the task on the literature and the students' own work.

Studies Abroad I (Business Analytics & Econometrics)					
Module Code 1314MESAb1	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Business Administration, Economics, Information Systems, Business Analytics or Econometrics.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods**				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depends on course selection				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Programmdirektor:in				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

Studies Abroad II (Business Analytics & Econometrics)					
Module Code 1314MESAb2	**Workload** 180h	**ECTS Credits** 6	**Module Language** selected language	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** Topics from the subjects: Business Administration, Economics, Information Systems, Business Analytics or Econometrics.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... The students… … acquire the knowledge and skills from the areas named in the module content which is equivalent to level 7 of the German Qualifications Framework for Lifelong Learning (Graduate Courses) and which extend beyond the curriculum of the relevant master programme and impart additional foundation knowledge (from subjects outside the relevant programme’s curriculum); deepen attained knowledge and skills which contribute towards the specialisation or content-specific individualisation of studies. ... ... Through completing examinations at a university abroad, students widen their knowledge and skills within the subject areas named above that go beyond the module structure of the curriculum of their study programme. Content studied within a module abroad can only be credited once within one of the Studies Abroad modules.				
4	**Teaching and Learning Methods**				
5	**Module Entry Requirements** None				
6	**Mode of End-Of-Module Examination** depending on course selection				
7	**Prerequisites for Awarding of Credit Points** depends on course selection				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Supplementary Section Business Analytics & Econometrics				
9	**Module Manager** Programmdirektor:in				
10	**Miscellaneous** If required, students can apply for credit transfer using the standardised procedure. Information about recognition of courses (deadlines and procedure) is provided by the WiSo Credit Transfer Centre (WiSo Anrechnungszentrum: https://www.anrechnungwiso.uni-koeln.de/). This module can				

	also be used for crediting Summer Schools organised by the WiSo-faculty. In this case, registration for the exams should be carried out in advance according to the regulations of the WiSo-faculty.

3.6.4 Master Thesis

Master Thesis in Business Analytics and Econometrics					
Module Code 1277MMDTA1	**Workload** 900h	**ECTS Credits** 30	**Module Language** German and English	**Module Availability** every term	**Duration** 1 Term
1	**Courses**		**Contact Hours**	**Self-Studies**	**Course Language**
2	**Module Content** The topic of the Master's thesis in Business Analytics and Econometrics must be taken from the area of specialisation or the group of the supplementary area occupied by the examination candidate.				
3	**Learning Objectives** Students... ... know and understand the relevant methods and theories for the points mentioned above under „Module content“. ... collect and analyse data material for selected scientific questions using quantitative / qualitative methods. ... collect, systematize and synthesize independently literature on selected scientific questions. ... prepare independently a research design for a question. ... write an academic paper on a selected topic and achieve thereby their own scientific contribution. ... present scientific results in a way that is appropriate for the target audience. ... use techniques of scientific work and good scientific practice.				
4	**Teaching and Learning Methods** Master’s Thesis				
5	**Module Entry Requirements** 60 ECTS credits obtained				
6	**Mode of End-Of-Module Examination** Written test 6 months				
7	**Prerequisites for Awarding of Credit Points** Passing the module examination.				
8	**Other Programmes that Use the Module** Master of Science Business Analytics & Econometrics: Master Thesis in Business Analytics and Econometrics				
9	**Module Manager** Academic Director MSc Business Analytics and Econometrics				
10	**Miscellaneous** The master’s thesis must be written in English.				