Module Manual M.Sc. Econometrics
Date: November 26, 2025

Please note that you must contact us before the start of the semester (till March 15 for the upcoming summer term and till September 15 for the upcoming winter term) if you wish to take courses that may be relevant to the Master's degree program but are not listed in the module handbook. Please contact Daniel.dzikowski@tu-dortmund.de in this regard.

Overview of the program:

NAME		Courses	Credit Points
STATISTICAL THEORY	ME1a	Statistical Theory	10
ASYMPTOTIC THEORY	ME1b	Asymptotic Theory	5
ECONOMETRICS	ME2	Econometrics	9
CASE STUDIES	ME3	Case Studies	8
TIME SERIES ANALYSIS	ME4	Time Series Analysis	10
COMPULSORY ELECTIVES:			48
ECONOMICS	ME5	Different courses	11-26
APPLIED ECONOMETRICS	ME6	Different courses	11-26
ECONOMETRIC METHODS	ME7	Different courses	11-26
MASTER THESIS	ME8	Master Thesis	30

Preliminary remarks

Many of the modules to be described below sharpen students' general skills such as presenting work, programming etc. To avoid redundancies in the module descriptions, we sketch such broad skills here. Aspects that are specific to individual modules will be presented in the corresponding descriptions.
The overarching goal of the Master of Econometrics is to train students in applying and developing methods to suitably model and analyze complex problems involving economic data. Students are not just to apply modern statistical techniques in a cookbook manner, but to thoroughly understand their common

foundations and relationships. Only then, we believe, will they be able to make meaningful contributions to both econometric methodology and applications.
Like with most learning goals, but certainly like with any quantitative technique, understanding of econometric methods cannot be achieved through repetitive memorizing. Likewise, while lectures are a useful starting point to introduce new topics, learning ultimately must be an active act rather than only passive consumption of a lecture. Such understanding therefore should be and will be fostered through steady and extensive active work on exercises and concrete applications. Regular tutorials hence are a core and crucial part of the program. Consequently, all of our modules complement lectures (if any) with such exercise sessions.

Next to a deeper understanding of the course material, such tutorials also provide students with effective learning and research strategies. First, experienced PhD students, post docs and professors share their tested approaches to solving complex problems. Second, students come to appreciate that working through concrete problems is an effective way to foster their grasp of different methodologies. Third, writing down their solutions develops students' skills in formulating mathematical, statistical and econometric relationships, as well as, fourth, verbal and written communication skills more generally.
The importance of such exercises is reflected in regular due dates for suitable problem sets. Meeting such compulsory deadlines helps students develop time management skills and a steady work routine. At the same time, the corrected exercises provide students with timely feedback to what extent their learning progress is in line with the progression of the corresponding course. We are therefore convinced that successfully completed problem sets are to be rewarded, and likewise believe that failure to submit such exercises should be sanctioned.
The study regulations aim for different types of assessments so as to reflect the variety of tasks a successful econometrician needs to fulfil in his or her later career. Specifically, students can acquire credits, next to the problem sets described above, through, e.g., oral presentations, term papers and oral exams. These train students' written and oral communication skills. Written exams ask students to actively apply the methods discussed in the various modules.
Modern statistical and econometric work is inconceivable without hands-on application of the methods in statistical computing languages such as R. Our assessments will therefore also regularly ask students to demonstrate that they know how to translate abstract methodology to real-world applications using real data.
Finally, econometric (like most other) research ultimately flourishes most when done, shared and communicated with others. We therefore provide students with regular opportunities to work in groups, e.g. asking them to jointly discuss a suitable line of attack to an empirical problem. Similarly, peer-learning formats help students develop and support each other.

A semester abroad also serves to develop such general, interdisciplinary skills. Students are encouraged to take some courses at a foreign partner university. In particular, the 3rd semester is suitable in this regard. Such international exchanges are for example supported by the ERASMUS programme.

Econometrics (M.Sc.) – Description of the modules

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<tr><td colspan="5">Module: Statistical Theory</td><td>Module ME1a</td></tr>
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Winter semester</td><td>Duration
1 semester</td><td>Study section
1st semester</td><td>Credit Points
10</td><td>Time
300 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td>1</td><td>Statistical Theory</td><td>L + T</td><td>10</td><td>4+2</td></tr>
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<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
The Statistical Theory module covers the main topics of basic statistical theory and consists of the two blocks ‘Probability Theory’ and ‘Decision Theory’.
The block ‘Probability Theory’ gives an introduction to measure theory and stochastics necessary to formalize the questions discussed in statistical theory.
The block ‘Decision Theory’ introduces the basic concepts associated with statistical tests. Possible topics include: decision rules, Bayes estimator, exponential families, the Neyman-Pearson lemma, two-tailed tests, Wald-tests, conditional tests, sequential hypothesis testing.</td></tr>
<tr><td>4</td><td colspan="5">Competences
Participants learn to use the formal language of statistics and gain knowledge of fundamental concepts in stochastics, decision theory and mathematical statistics, which are required in order to analyze, apply and further develop statistical procedures.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Statistical Theory: Graded written exam</td></tr>
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<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
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- none -</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Compulsory module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. M. Demetrescu, Prof. Dr. C. Jentsch</td><td colspan="3">Responsible Department
TU Dortmund University, Department of Statistics</td></tr>
</table>

Module: Asymptotic Theory				**Module ME1b**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Asymptotic Theory	L + T	5	2+1

2 Language of instruction
English

3 Contents of the module
The course 'Asymptotic Theory' deals with asymptotic properties of statistical methods and presents various central limit theorems used in statistics. The Asymptotic Theory course starts after the first half of the semester and takes place entirely in the second half of the semester (then as a 4+2 course).

4 Competences
Participants learn to use the formal language of statistics and gain knowledge of fundamental concepts in stochastics and mathematical statistics, which are required in order to analyze, apply and further develop statistical procedures.

5 Examinations
Asymptotic Theory: Graded written or oral exam

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Compulsory module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. C. Jentsch	TU Dortmund University, Department of Statistics

Module: Econometrics				**Module ME2**
M.Sc. Program: Econometrics				
Frequency Each semester	**Duration** 1 semester	**Study section** 1st and 2nd semester	**Credit Points** 9	**Time** 270 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Econometrics	L + T	9	6
1b	Recent Developments in Econometrics	L + T	9	6
1*	Advanced Econometrics	L + T	9	6

2 Language of instruction
English

3 Contents of the module
The lecture deals with a wide range of fundamental econometric methods. Special emphasis is placed on asymptotic results to allow for a general discussion of the statistical properties of these methods. The main focus lies on a formally precise description of the concepts. Topics include the linear regression model, the generalized linear regression model, maximum likelihood estimation and inference, asymptotic theory, endogenous regressors, instrumental variables, generalized method of moments and regression models for time series, among others.
Students can choose between 'Econometrics' and 'Recent Developments in Econometrics'.

**Students, who already took the course 'Econometrics' during the completion of a Bachelor degree at TU Dortmund University, require to take the course 'Advanced Econometrics' (cf. Advanced Topic in Econometrics Methods, Block ME7) to achieve the necessary credits for module ME2.*

4 Competences
Participants learn to use the fundamental concepts in econometrics, which are required in order to further develop and to successfully apply the statistical methods.

5 Examinations
Graded written exam. The lecturer may include further requirements necessary to attend the final exam. These requirements and the form of the examination will be announced at the beginning of the course.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Compulsory module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
JProf. Dr. A. Arsova / Prof. Dr. C. Hanck	TU Dortmund University, Department of Statistics, University of Duisburg-Essen, Department of Business Administration and Economics

Module: Case Studies				**Module ME3**
M.Sc. Program: Econometrics				
Frequency: Summer semester	**Duration** 1 semester	**Study section** 2nd and 3rd semester	**Credit Points** 8	**Time** 240 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Case Studies	P	8	4

2 Language of instruction

English

3 Contents of the module

In the course 'Case Studies' participants work on statistical problems in one or two larger projects, usually using raw economic data. Working in groups, they independently choose appropriate statistical methods and adapt them to the problem at hand, in order to carry out a comprehensive analysis of the data. The initial research question, methods, analysis and results are to be presented in a detailed written report and an oral presentation. A special focus is put on the "translation" of the initial question into a statistical/data-analytic problem. After completion of the latter, the results are used to provide an answer to the research question. Both the methodological approach and the results regarding the research question are discussed together with the other participants.

Alternatively, by agreement, this course may be replaced by an extra-curricular internship, during which students participate in the analysis of raw data in a project within an institution, specialized in statistical advisory work. Subsequently the statistical analysis is summarized in a written report on the internship.

4 Competences

Participants gain practice in independent scientific research as well as in the presentation of the statistical results in written and oral form. They expand methodological skills and various interdisciplinary qualifications such as teamwork, presentation techniques or communication skills. Working on larger projects trains the skills in project management. Furthermore, the course serves to enhance the counseling competence of the students.

5 Examinations

Graded written report. Details will be announced at the beginning of the course. Attendance at the presentations may be compulsory. This is the decision of the lecturer if s/he deems it to be necessary to achieve the learning goals of the course.

6 Type of Examination

covering the entire module	Relating to individual courses

7 Requirements

if there are requirements in case of conditional admission (any of modules ME Req1 to ME Req7), these have to be fulfilled by the start of the course "Case Studies" or the external internship

8 Status of the Module

Compulsory module in M.Sc. Econometrics

9	**Module Coordinator** Lecturers from TU Dortmund University, Department of Statistics	**Responsible Department** TU Dortmund University, Department of Statistics

Module: Time Series Analysis				**Module ME4**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Time Series Analysis	L + T	10	6

2 Language of instruction
English

3 Contents of the module
The course initially covers methods of descriptive time series analysis. Then, structural theory and estimation of time series models are discussed. Core topics include approximation and elimination of trends, the theory of linear filters, 'naive' forecasting, exponential smoothing, stationary stochastic processes, optimal linear forecasts, ARMA-processes, the autocorrelation function, model identification and parameter estimation in the time domain.

4 Competences
Participants gain insight on the most common methods for time-dependent data and are able to apply these methods.

5 Examinations
Graded written exam. The lecturer may include further requirements necessary to attend the final exam. These requirements and the form of the examination will be announced at the beginning of the course.

6 Type of Examination

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Compulsory module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. R. Fried / Prof. Dr. C. Jentsch	TU Dortmund University, Department of Statistics

Compulsory Electives					**Blocks ME5-ME7**
M.Sc. Program: Econometrics					
Frequency Each semester		**Duration** 2-3 semesters	**Study section** 1st to 3rd semester	**Credit Points** 48	**Time** 1.440 h
1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Block ME5: Economics		At least 11, at most 26	330 – 780h
	2	Block ME6: Applied Econometrics		At least 11, at most 26	330 – 780h
	3	Block ME7: Econometric Methods		At least 11, at most 26	330 – 780h
2	**Language of instruction** English or German				
3	**Contents of the module** In the compulsory elective areas, students acquire content-related material and specialist competences for practical use. With regard to the precise learning contents of the individual courses, participants are referred to the module descriptions for the respective elective block.				
4	**Competences** Participants acquire knowledge about current theoretical developments in micro- or macroeconomics, applied econometrics and econometric methods. The focus is on the discussion, adaptation and application of various econometric tools on the one hand and on advanced and up-to-date topics of economic interest on the other hand.				
5	**Examinations** The examinations depend on the modules in the respective compulsory elective areas and the module manuals on which they are based. In each compulsory elective block, modules with a minimum of 11 credit points have to be successfully completed. A total of 48 credit points must be acquired.				
6	**Type of Examination** Either covering the entire module or relating to individual courses, depending on the chosen module.				
7	**Requirements** The entry requirements for the individual modules are based on the module descriptions of the respective selected modules.				
8	**Status of the Module** Elective modules in M.Sc. Econometrics				
9	**Module Coordinator** Lecturers from the responsible departments		**Responsible Department** Participating departments from TU Dortmund University, University of Duisburg-Essen and Ruhr-University Bochum		

Module: Master Thesis					**Module ME8**
M.Sc. Program: Econometrics					
Frequency Each semester		**Duration** 1 semester	**Study section** 4. semester	**Credit Points** 30	**Time** 900 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Master Thesis		22.5	675
2	Disputation		7.5	225

2 Language of instruction
English

3 Contents of the module
The master thesis demonstrates that students are able to independently apply and adapt scientific methods to an econometric problem within a given period of time. The thesis needs to be completed within six months. Topics are offered each semester by the entire faculty of the program, so that students can choose from a variety of topics. They are also welcome to make their own suggestions for topics. The thesis can also be written at - or on collaboration with - an external public or private institution.
After submission of the master thesis, the results are to be presented in form of a disputation.

4 Competences
With the successful completion of the Master thesis, the students show that they have the ability to independently conduct econometric research.

5 Examinations
Master Thesis (75%) and disputation (25%)**.**

6 Type of Examination

covering the entire module	Relating to individual courses

7 Requirements
At least 42 credit points in the compulsory area as well as 30 credit points in the compulsory elective area. To participate in the disputation, the Master Thesis must have been passed with at least the grade "sufficient" (4.0).

8 Status of the Module
Compulsory module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Lecturers from the responsible departments	Participating departments from TU Dortmund University, University of Duisburg-Essen and Ruhr-University Bochum

Compulsory Elective Courses

The set of compulsory electives is subject to change over time. We will react to new developments in econometrics through suitable additions to the current list of compulsory electives. At the same time, changes in the composition of the program's faculty through, e.g., new hires or retirements will be reflected in the course offerings. In particular, new teaching staff will contribute new expertise. **Also note that some compulsory electives may be credited for more than one block (ME5-ME7)**

Block ME5 (Economics)

The following list gives a selection of possible courses. Courses that can be selected for this area will be identified in the course catalog available online.

Course	Type	Credit Points	Credit Hours
TU Dortmund University			
Applied Economics I (Applied Monetary Economics)	L + S	7.5	4
Applied Economics III (Advanced Business Cycle Analysis)	L + T	7.5	4
Internationale Wirtschaft I (Urban Economics)	L + T	7.5	4
Internationale Wirtschaft II (International Economics)	L + T	7.5	4
Internationale Wirtschaft III (Selected Topics in International Economics)	S	7.5	4
Wirtschaftspolitik I (Labor Economics)	L integrated E	7.5	4
Wirtschaftspolitik III (Economic Policy)	L integrated E	7.5	4
Öffentliche Finanzen I (Economic Analysis of Law)	L + T	7.5	4
Makroökonomie I (Economic Growth and Historical Development)	L integrated E	7.5	4
Makroökonomie III (Regional Disparities)	L + T	7.5	4
Makroökonomie IV (Dynamic Macroeconomics)	L + T	7.5	4
Makroökonomie V (Chancen und Grenzen ökonomischen Wachstums)	L + S	7.5	4
Mikroökonomie I (Microeconomics)	L + T	7.5	4
Narrative Economics and the Media	L + S	7.5	4
Seminar Microeconomics	S	7.5	4
Soziale Sicherung	S	7.5	2
Ruhr-University Bochum			
Seminar in Advanced International trade	S	5	2
Business Cycle Analysis and Forecasting	L	10	2
Current Topics in Health Economics	S	5	2
Economic Policy and the Media	S	5	4
Economics of Innovation	L + T	10	4

Labor Economics	L + T	5	4
Macroeconomics II	L + T	5	4
Market- and Non-Market Valuation of Environmental Goods	S	5	2
Microeconomics	L + T	5	4
Industrial Organization	L + T	5	4
Network Economics	L + T	5	4
Public Economics	L + T	10	5
Seminar in Applied Economic Policy	S	5	2
Seminar on Health Economics and Health Policy	S	5	2
Seminar Public Choice	S	5	2
University of Duisburg-Essen			
Advanced Industrial Organization	L + T	6	4
Data Science in Energy and Environment	S	6	2
Electricity, Renewables and District Heating	L + T	6	4
Empirie der internationalen Geld- und Finanzmärkte	L + T	6	4
Energy Forecasting Competition	L + S	6	4
Energy Markets and Price Formation	L + T	6	4
Entscheidungstheorie	L + T	6	4
International Capital Movements: Theory and Econometric Evidence	L + T	6	4
Labour Economics and Public Policy	L integrated E	6	4
Migration Economics	L integrated E	6	4
Neuere Entwicklungen der Mikroökonomik	Kolloqium	6	2
Selected Topics in Empirical Capital Market Research	S	6	2
Seminar Health and Development	S	6	2
Seminar Labour Economics and Public Policy	S	6	2
Seminar Soziale Sicherung und Besteuerung: Empirische Studien und eigene Projekte	S	6	4
Stock Market Anomalies and Quantitative Trading Strategies	L integrated S	6	4
Structuring and Valuation	L + T	6	4

Block ME6 (Applied Econometrics)

The following list gives a selection of possible courses. Courses that can be selected for this area will be identified in the course catalog available online.

Course	Type	Credit Points	Credit Hours
TU Dortmund University			
Advanced R: Theory, Concepts, and Paradigms	L + T	4.5	4
Advanced Text Mining Methods	S	7.5	4
Applied Bayesian Data Analysis	L + T	9	6
Applied Economics I (Applied Monetary Economics)	L + S	7.5	4
Applied Economics II (Applied Macroeconometrics)	L + T	7.5	4
Bayesian Data Analysis	S	4	2
Causal Inference	L + T	4.5	3
Econometric Forecasting	L + T	4.5	3
Econometrics of treatment effects and policy evaluation	L + T	4.5	3
Einführungskurs in SQL und APIs	L + T	2	2
Finance I (Data and AI in Economics)	L + T	7.5	4
Finance III (Financial Econometrics)	L + T	7.5	4
Machine Learning for Economic Data	L + T	4.5	3
Makroökonomie III (Regional Disparities)	L + T	7.5	4
Modern Methods in Survey Sampling	L + T	4.5	3
Nonparametric and High-Dimensional Econometrics	L+ T	4.5	3
Programming with Julia	L + T	3	3
Programming with Python	L + T	3	3
Programming Course with R	L + T	3	3
Programming with SAS	L + T	3	3
Finance V (Research Topics in Finance, Risk- and Resourcemanagement)	L + T + S	7.5	4
Ruhr-University Bochum			
Applied Econometrics with R	L + T	5	4
Applied Time Series Analysis	L + T	10	4
Business Cycle Analysis and Forecasting	L	10	2
Data Analysis Using R	S	10	2
Introduction to Empirical Macroeconomics	L	10	2
Introduction to Microeconometrics	L + T	5	2
Econometric Evaluation of Economic Policies	L	5	2
Machine Learning and Programming in Python	L	5	2

Quantitative Regional Economics	S	5	1
Seminar in Microeconometrics	S	10	4
University of Duisburg-Essen			
Advanced R for Econometricians	L + T	6	4
Applied Labour Economics	L integrated E	6	4
Deep Learning in Energy	L + T	6	2
Econometrics of Electricity Markets	L + T	6	4
Empirical Finance	L	5	2
Empirische Bilanzanalyse	L + T	6	4
Empirische Methoden	L + T	6	4
Financial Mathematics	L + T	6	4
Financial Risk Management	L + T	6	4
Inequality in Health	L integrated E	6	4
Mikroökonometrie	L + T	6	4
Portfolio Management	L + T	6	4
Practising Econometric Research	S	6	4
Quantitative Climate Finance	L + T	6	4
Quantitative Modelle internationaler Wirtschaftsbeziehungen	L + T	6	4
Selected Topics in Risk Management	S	6	2
Statistical Learning	L + T	6	4

Block ME7 (Econometric Methods)

The following list gives a selection of possible courses. Courses that can be selected for this area will be identified in the course catalog available online.

Course	Type	Credit Points	Credit Hours
TU Dortmund University			
Advanced Bayesian Data Analysis	L + T	4.5	3
Advanced Econometrics	L + T	9	6
Advanced Statistical Learning	L + T	9	6
Advanced Text Mining Methods	S	7.5	4
Applied Bayesian Data Analysis	L + T	9	6
Bayesian Econometrics	L + T	4.5	3
Bayes-Statistik	L + T	9	6
Bootstrap Methods	L + T	9	6
Causal Inference	L + T	4.5	3
Causality	L + T	4,5	3
Decision Trees and their Optimization	L + T	4,5	3
Econometric Forecasting	L + T	4.5	3
Econometrics of treatment effects and policy evaluation	L + T	4.5	3
Empirical processes	L + T	4.5	3
Financial Econometrics	L + T	4.5	3
Generalized Linear Models	L + T	9	6
Hidden Markov and State Space Models	L + T	4.5	3
High-Dimensional Time Series Analysis	L + T	4,5	3
Maschinelles Lernen	L + T	6	4
Multiples Hypothesentesten	L + T	4.5	3
Natural Language Processing	L + T	9	6
Nonparametric and High-Dimensional Econometrics	L + T	4.5	3
Panel Data Analysis I	L + T	4.5	3
Panel Data Analysis II	L + T	4.5	3
Resampling Verfahren	S	4	2
Robuste statistische Verfahren	L + T	9	6
Robuste statistische Verfahren	L + T	4.5	3
Seminar in Econometrics	S	4	2
Seminar in Zeitreihenökonometrie	S	4	2
Sequentielle Verfahren	L + T	9	6
Statistical Methods for Counting Processes	L + T	4.5	3
Statistical Network Analysis	L + T	4.5	3
Extremwertstatistik	L + T	4.5	3
Stochastische Prozesse	L + T	9	6
Survival Analysis	L + T	9	6
Time Series Econometrics	S	4	2
Unit Root and Cointegration Analysis	L + T	9	6
Wissensentdeckung in Datenbanken	L + T	8	6

Ruhr-University Bochum			
Financial Econometrics	L + T	10	4
Introduction to Artificial Intelligence	L + T	5	2
Multivariate Statistical Methods	L + T	10	4
Seminar in Econometrics	S	10	2
University of Duisburg-Essen			
Applied Panel Time Series Analysis in International Economics	L + S	6	4
Bayesian Econometrics	L + T	6	4
Causality and Programme Evaluation	L integrated T	6	4
Multivariate Time Series Analysis	L+T	6	4
Nonparametric Econometrics	L + T	6	4
Financial Econometrics	L + T	6	2
Seminar Ökonometrische Methoden	S	6	2
Statistical Learning	L + T	6	4
Statistical Modelling of Extremes	L + T	6	4
Statistisches Seminar	S	6	2
Stichprobentheorie	L + T	6	4
Stochastic Simulation	L + T	6	4

Prohibited Combinations of Compulsory Elective Courses

The chosen courses may not coincide with similar courses already chosen within one of the compulsory elective blocks.

The prohibited combinations of similar courses are the following:

Stat. Learning	Advanced Industrial Organization	Advanced R for Econometricians	Advanced Bayesian Data Analysis	Advanced Statistical Learning	Bayesian Econometrics	Bayes-Statistik	**Maschinelles Lernen**	Labor Economics	Mikroökonomie II	Applied Time Series Analysis	Financial Econometrics	Intro. Microeconometrics	Macroeconomics II	Data Analysis Using R	Machine Learning and Programming with Python	
					X	X										Bayesian Econometrics
									X							Entscheidungstheorie
								X								Labour Economics and Public Policy
												X				Mikroökonometrie
																Stat. Modelling of Extremes
				X			X									Stat. Learning
		X												X		Advanced R
						X										Advanced Bayesian Data Analysis
			X			X										Applied Bayesian Data Analysis
X							X								X	Machine Learning for Economic Data
															X	Programming with Python
X							X									**Wissensentdeckung in Datenbanken**
									X							Applied Economics II
X															X	Finance I
										X						Finance III
	X															Mikroökonomie I (Game Theory)
													X			Makroökonomie IV
								X								Labor Economics
		X														Data Analysis Using R
	X															Microeconomics II

Universität Duisburg-Essen - Faculty of Business Administration & Economics
TU Dortmund - Faculty of Statistics
TU Dortmund - Faculty of Computer Science
TU Dortmund - Faculty of Business and Economics
Ruhr-Universität Bochum - Faculty of Management & Economics

Recommended Course of Study (Start: Winter and Summer)

technische universität dortmund

UNIVERSITÄT DUISBURG ESSEN

RUHR UNIVERSITÄT BOCHUM RUB

Econometrics Master Program

Plan 3

Study Plan

When starting in winter semester

1st semester	2nd semester	3rd semester	4th semester
Module ME1 a: **Statistical Theory** Statistical Theory (4+2): 10 ECTS; written exam Probability Theory | Decision Theory	**Module ME4:** **Time Series Analysis** Time Series Analysis (4+2): 10 ECTS; oral or written exam	**Module ME3:** **Case Studies** Case Studies (4P) or external internship (min. 6 weeks): 8 ECTS; written report ***Note: The course "Case Studies" is offered every semester; in the summer semester in English and in the winter semester only in German (as "Fallstudien II").***	**Module ME8:** **Master Thesis** Prerequisites: successful completion of modules ME1a, ME1b, ME2, ME3, ME4 and succesful completion of modules amounting to at least 30 ECTS in compulsory elective areas ME5, ME6, and ME7.
Module ME1 b: **Asymptotic Theory** Asymptotic Theory (2+1): 5 ECTS; written exam	**Module ME2:** **Econometrics** Econometrics (4+2): 9 ECTS; written exam ***Note: The course "Econometrics" is offered every semester; in the winter semester at UDE and in the summer semester at TUDO.***		module exams: Master Thesis (22.5 ECTS) and Disputation (7.5 ECTS)
	Compulsory Elective Area **Modules in Economics ME5:** Elective modules from MHB; 11-26 ECTS; module exams **Modules in Applied Econometrics ME6:** Elective modules from MHB; 11-26 ECTS; module exams ^ **Modules in Econometric Theory ME7:** Elective modules from MHB; 11-26 ECTS; module exams ***Note: In the entire elective area modules with a total of 48 ECTS have to be chosen.***		
Total: 30 ECTS	Total: 30 ECTS	Total: 30 ECTS	Total: 30 ECTS

blue: courses at University Duisburg-Essen
green: courses at TU Dortmund University
brown: courses at Ruhr-University Bochum, TU Dortmund University, or University of Duisburg-Essen

Denoted hours:
P: Practical course
else: Lecture + Tutorial or Lecture only

technische universität dortmund

UNIVERSITÄT DUISBURG ESSEN

RUHR UNIVERSITÄT BOCHUM RUB

Econometrics Master Program

Plan 5

Study Plan

When starting in summer semester

1st semester	2nd semester	3rd semester	4th semester
Module ME2: **Econometrics** Econometrics (4+2): 9 ECTS; written exam *Note: The course "Econometrics" is offered every semester; in the winter semester at UDE and in the summer semester at TUDO.*	**Module ME1a:** **Statistical Theory** Statistical Theory (4+2): 10 ECTS; written exam Probability Theory | Decision Theory	**Module ME4:** **Time Series Analysis** Time Series Analysis (4+2): 10 ECTS; oral or written exam	**Module ME8:** **Master Thesis** Prerequisites: successful completion of modules ME1a, ME1b, ME2, ME3, ME4 and succesful completion of modules amounting to at least 30 ECTS in compulsory elective areas ME5, ME6, and ME7.
	Module ME1b: **Asymptotic Theory** Asymptotic Theory (2+1): 5 ECTS; written exam	**Module ME3:** **Case Studies** Case Studies (4P) or external internship (min. 6 weeks): 8 ECTS; written report *Note: The course "Case Studies" is offered every semester; in the summer semester in English and in the winter semester only in German (as "Fallstudien II").*	module exams: Master Thesis (22.5 ECTS) and Disputation (7.5 ECTS)
	Compulsory Elective Area **Modules in Economics ME5:** Elective modules from MHB; 11-26 ECTS; module exams **Modules in Applied Econometrics ME6:** Elective modules from MHB; 11-26 ECTS; module exams **Modules in Econometric Theory ME7:** Elective modules from MHB; 11-26 ECTS; module exams *Note: In the entire elective area modules with a total of 48 ECTS have to be chosen.*		
Total: 30 ECTS	Total: 30 ECTS	Total: 30 ECTS	Total: 30 ECTS

blue: courses at University Duisburg-Essen
green: courses at TU Dortmund University
brown: courses at Ruhr-University Bochum, TU Dortmund University, or University of Duisburg-Essen

Denoted hours:
P: Practical course
else: Lecture + Tutorial or Lecture only

Compulsory Elective Courses – Ruhr-University Bochum

<table>
<tr><td colspan="5">Module: Seminar in Advanced International Trade</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
5</td><td>Time
150 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Seminar in Advanced International Trade</td><td>S</td><td>5</td><td>150 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
The seminar deals with different core topics in the area of international trade. It combines theoretical and empirical perspectives. For instance, the seminar deals with firm behavior on global markets, global value chains, trade policy or the nexus between trade and labor markets.</td></tr>
<tr><td>4</td><td colspan="5">Competences
The seminar will deal with major issues in international trade. By enrolling in this seminar, students can broaden and employ their theoretical and econometrics knowledge to this subfield of economics.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
The final module examination consists of a written seminar paper. An additional course achievement can be accomplished in the form of an oral presentation of the seminar paper, for which bonus points can be earned. A maximum of 75 points can be earned for the seminar paper, and a maximum of 25 points for the presentation. The module score then results from a scale of points ranging from zero to 100 points. The bonus points will also be credited of the module finale examination would not have been passed without the bonus points.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
Obligatory: International Trade</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="3">Module Coordinator
Prof. Dr. Matthias Busse / Jun.-Prof. Dr. Sanne Kruse-Becher</td><td colspan="2">Responsible Department
RUB Faculty of Management and Economics</td></tr>
</table>

Module: Current Topics in Health Economics				**ME5**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Current Topics in Health Economics	S	5	150 h

2 Language of instruction
English

3 Contents of the module
In this seminar students will explore a variety of current topics in health economics. The topics will cover both empirical and theoretical contributions. Students will prepare their seminar papers in the first half of the semester and present their papers in the second half of the semester. Further course details will be given at the introductory meeting.

4 Competences
Students enhance their ability to understand and assess scientific literature. They also strengthen their knowledge of econometric methods by examining the methodology employed by relevant peer-reviewed papers. During the seminar, students get to know current issues in health economics, learn to write a seminar paper and improve their presentation skills.

5 Examinations
65%: Term paper
25%: Presentations
10%: Active participation in the course

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, sufficient proficiency in microeconomics and microeconometrics in order to be able to read and understand the current international theoretical or empirical literature is strongly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Ansgar Wübker	RUB Faculty of Management and Economics

Module: Economic Policy and the Media					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 2nd semester	**Credit Points** 5	**Time** 150 h	

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
		Economic Policy and the Media	S	5	150 h
2	**Language of instruction** English				
3	**Contents of the module** The seminar focusses on the interplay between politics, the market and the media. Which economic policy issues rise to the top of the public agenda, and which ones don't? Which ones are being prioritized, and which ones neglected? Whose interests are highlighted, and whose are largely ignored? Studying these questions may be just a sideshow in standard economics. However, they are at the core of the practical conduct of economic policy. The seminar offers concepts to systematically evaluate current policy issues and their public perception. Special attention is devoted to the news media, who play an outsized role in setting the economic policy agenda setting.				
4	**Competences** The seminar enables students to analyze the dynamics involved in the setting of the economic policy agenda.				
5	**Examinations** Participants are asked to write 15-to-20-pages term papers, that apply these approaches to specific current economic policy issues. In a final session (presence) the results are presented and discussed				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** Basic knowledge of the major fields of economic policy (e.g. monetary, fiscal, tax, trade, competition, labor, social protection...). General interest in current issues.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Michael Ross and Prof. Dr. Henrik Müller		**Responsible Department** RUB Faculty of Management and Economics		

Module: Economics of Innovation					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Economics of Innovation	L + T	10	4
2	**Language of instruction** English				
3	**Content of the Module** Market structure and the incentive to innovate, competition and innovation, patent policy (optimal patent length and optimal patent breadth), patent races.				
4	**Competences** Students learn about the crucial role of innovation and technical progress from a microeconomic perspective. The focus is not on perfect competition via prices, but on the competition of ideas (Schumpeter's "creative destruction"). The modul analyses the role of industry structure for innovation incentives. The students should be able to understand the trade off in patent policy between setting ex ante the right incentives to innovate and the ex post deadweight welfare loss due to monopoly. The role of government in setting patent policy is explained. In the follow up semester, there is usually a seminar on the economics of innovation. In order to attend the seminar, it is a necessary condition to have attended and passed this module, because the content of this module is a prerequisite to understand the models of the seminar.				
5	**Examinations** The module grade results from the grade of a seminar paper. Up to 25 % of the total number of points attainable in the module can be acquired as bonus points in a written exam. The best grade cannot be achieved without bonus points. Bonus points are only credited if the seminar paper achieves a passing grade without the bonus points.				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** Good knowledge of microeconomics and mathematics. Good command of English.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Robledo		**Responsible department** RUB Faculty of Management and Economics		

Module: Labor Economics				**ME5**
M.Sc. Program: Econometrics				
Frequency Summer Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Labor Economics	L + T	5	150

2 Language of instruction
English

3 Content of the Module
The labor market affects the daily lives and the welfare of every individual directly. Hence, the analysis of labor markets is of importance and interest not only to economists but to the population at large. Labor economics is a very challenging and a stimulating area in economics due to the special characteristics of the labor market. For example, different to capital workers are not commodities with fixed characteristics and make decisions about the nature of their participation in the labor market. Institutions affect the labor market much more than any other market. The aim of this module is to give an understanding of the distinctive features of labor markets and the ways in which they operate. Among other things, we will analyze labor supply, labor demand, human capital, and the role of different labor market institutions and labor market policies for wages and employment. Throughout the module, we attempt to integrate theoretical issues and empirical evidence, and to address questions of policy. The latter will concentrate on European issues.

4 Competences
The aim of this module is to develop an understanding of the distinctive features of labor markets and the ways in which they operate. Among other things, we will analyze labor supply, labor demand, human capital, and the role of different labor market institutions and labor market policies for wages and employment. The students learn to interpret the implications and consequences of different labor market policies. Throughout the module, we attempt to integrate theoretical issues and empirical evidence in order to apply the theoretical models to real world problems. Also, questions of policy concentrating on European issues will be addressed.

5 Examinations
The final grade of the module is determined by the grade of the final examination. An additional academic achievement can be obtained in the form of a presentation of a research paper as part of the exercise. Up to 5 bonus points can be earned, which are then credited towards the points achieved in the final exam. The bonus points will also be credited if the final exam would not have been passed without the bonus points.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
Good knowledge of microeconomics and mathematics. Good command of English.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Thomas Bauer	RUB Faculty of Management and Economics

Module: Macroeconomics II				**ME5**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Macroeconomics II	L + T	5	150 h

2 Language of instruction
English

3 Contents of the module
The course will consider both economic theory and advanced mathematical techniques. The first part of the course will cover continuous time dynamics (ordinary differential equations, systems of linear differential equations, the concepts of stability and phase diagrams), systems of difference equations, and chaos theory. In the second part, we will cover economic applications (e.g., closed economic dynamics, employment and inflation, etc.) of these procedures. The software R is ideally suited for solving and plotting dynamic systems; its use and knowledge will be required to solve the problem sets proposed during the course.

4 Competences
- To deepen knowledge and understanding of macroeconomic theories and dynamics.
- To improve mathematical skills and concepts.
- To acquire practical skills in using the R software for computational purposes.

5 Examinations
Written exam (100% of the final grade)
Mid-Term exam (not graded)

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, knowledge of macroeconomic models and concepts at the principles to intermediate level is expected. We will work intensively with R software: it is not necessary to have previous experience with this software, but the willingness to learn how to use it is expected.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Michael Roos	RUB Faculty of Management and Economics

<table>
<tr><td colspan="5">Module: Market- and Non-Market Valuation of Environmental Goods</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
5</td><td>Time
150 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Market- and Non-Market Valuation of Environmental Goods</td><td>S</td><td>5</td><td>150 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
The valuation of environmental goods and amenities is often complicated by the lack of market prices. This seminar will deal with empirical methods to estimate the value of environmental goods and amenities. Methods to be covered include both market and non-market valuation methods, such as hedonic pricing, contingent-valuation and revealed-preference methods to elicit willingness-to-pay and willingness-to-accept.</td></tr>
<tr><td>4</td><td colspan="5">Competences
Students acquire knowledge on empirical methods to estimate the value of environmental goods and amenities. Furthermore, they improve their ability to understand and assess scientific literature, learn to write a seminar paper and to present their work.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Term paper (10 pages) with presentation (15 min)</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
None.</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="3">Module Coordinator
Prof. Dr. Manuel Frondel and postgraduates of RWI</td><td colspan="2">Responsible Department
RUB Faculty of Management and Economics</td></tr>
</table>

<table>
<tr><td colspan="5">Module: Microeconomics</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
5</td><td>Time
150 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Microeconomics</td><td>L + T</td><td>5</td><td>150 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
The module covers standard microeconomic topics at graduate level: consumer choice, production and costs, competitive markets, general equilibrium, efficiency and welfare theorems.</td></tr>
<tr><td>4</td><td colspan="5">Competences
This module is an introduction to modern microeconomics and its applications to applied economic policy at graduate level. Students learn the standard modelling techniques. After attending this module, students should be able to read and understand microeconomic oriented scientific literature.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
The module final grade is determined entirely by the grade of the final exam.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
None. However, good knowledge of microeconomics and mathematics is strongly recommended.</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. Julio R. Robledo</td><td colspan="3">Responsible Department
RUB Faculty of Management and Economics</td></tr>
</table>

Module: Industrial Organization					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Industrial Organization	L + T	5	150 h

2 Language of instruction
English

3 Contents of the module
The module covers standard industrial organizational topics at graduate level: monopoly, oligopoly, price discrimination, horizontal and vertical product differentiation, bundling and tying.

4 Competences
This module is an introduction to modern microeconomics and its applications to applied economic policy at graduate level. Students learn the standard modelling techniques. After attending this module, students should be able to read and understand industrial organizational oriented scientific literature.

5 Examinations
The module final grade is determined entirely by the grade of the final exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, good knowledge of microeconomics and mathematics is strongly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Julio R. Robledo	RUB Faculty of Management and Economics

Module: Network Economics					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer Semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Network Economics	L + T	5	150 h

2 Language of instruction

English

3 Contents of the module

This module analyses competition on network markets with the tools of industrial economics. Topics are complementarities, compatibility, network externalities, switching costs etc. The focus is on the hardware and software industry, telecommunication, informational goods, bank networks, etc. Previous knowledge in industrial organization is helpful, but it not a prerequisite, since we will briefly review the main concepts. The students should obtain a sound knowledge in network economics that allows them to read and understand original papers in the literature.

4 Competences

This module is an introduction to network markets and its applications to applied economic policy. Students learn the standard modelling techniques. After attending this module, students should be able to read and understand network oriented scientific literature.

5 Examinations

The module final grade is determined entirely by the grade of the final exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, good knowledge of microeconomics and mathematics is strongly recommended.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Julio R. Robledo	RUB Faculty of Management and Economics

Module: Public Economics					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Public Economics	L + T	10	300 h

2 Language of instruction
English

3 Contents of the module
The course provides an overview over advanced theoretical models and empirical results of the modern public economics literature. Topics covered are taxation (efficiency, incidence and optimal taxation), public debt (normative justifications for public debt, political economy considerations, the European debt crisis), the role of government institutions, public good provision, externalities, social insurance (adverse selection and moral hazard), redistribution and social welfare as well as international aspects of public economics (international tax and systems competition). The course also provides a brief introduction to micro-econometric methods used in modern empirical public economics.

4 Competences
Students are enabled to explain basic theoretical and empirical concepts of the modern public economics literature. They are in the position to understand and critically assess modern theoretical and empirical work in this filed. They are furthermore familiar with empirical policy evaluation methods and can implement them in Stata.

5 Examinations
100% written exam

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, good knowledge of microeconomics and econometrics as well as an interest in combining microeconomic theory with empirical research is strongly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Thushyanthan Baskaran	RUB Faculty of Management and Economics

Module: Seminar on Health Economics and Health Policy				**ME5**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Seminar on Health Economics and Health Policy	S	5	150 h

2 Language of instruction

English

3 Contents of the module

The German population is projected to contract by more than 10% by 2050. This makes Germany relatively unique among larger EU countries, which are forecast to face less dramatic decline (Italy) or even grow slightly (France, Spain, UK) over the same period (UN, 2012). While the German population will decline overall, the number of elderly people will continue to grow as the population ages. An increasing old-age dependency ratio creates enormous challenges for health insurance, health care and long-term care (LTC) in Germany. Moreover, the changing size and composition of the population is not affecting all parts of Germany in a uniform way: this process is known as geo-demographic change. Some regions are thus facing particular challenges due to a rapidly ageing population and dwindling human resources in the care sector.

In this seminar students will prepare a term paper based on selected challenges imposed by population aging and the geo-demographic change. The topics will cover both empirical and theoretical contributions. Students will thus have the possibility to acquire important knowledge and methodological skills for the successful completion of a master thesis in health economics and related fields. Students will prepare their seminar papers in the first half of the semester and present their papers in the second half of the semester. Further course details will be given at the introductory meeting.

4 Competences

Students enhance their ability to understand and assess scientific literature. They also strengthen their knowledge of econometric methods by examining the methodology employed by relevant peer-reviewed papers. During the seminar, students get to know current issues in health economics, learn to write a seminar paper and improve their presentation skills.

5 Examinations

Term paper with presentations and active participation in the course

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, sufficient proficiency in microeconomics and microeconometrics in order to be able to read and understand the current international theoretical and empirical literature is strongly recommended. Moreover, students should be interested in health policy issues.

8 Status of the Module

Elective module in M.Sc. Econometrics

9	**Module Coordinator** Prof. Dr. Ansgar Wübker	**Responsible Department** RUB Faculty of Management and Economics

Module: Seminar Public Choice				**ME5**
M.Sc. Program: Econometrics				
Frequency irregularly	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Seminar Public Choice	S	5	150 h

2 Language of instruction

English

3 Contents of the module

The seminar aims to improve the understanding of political institutions and decision making in democracies from a theoretical and empirical perspective. After a kick-off meeting at the beginning of the semester, students are expected to write a term paper on current topics in public choice and present their results in a block seminar. They critically assess empirical research in this area. Further course details will be given in the introductory meeting.

4 Competences

Students enhance their ability to understand and assess scientific literature. During the seminar, students get to know current issues in public choice, learn to write a seminar paper and improve their presentation skills.

5 Examinations

The final module examination consists of a term paper (70% of the final grade) and an oral examination (30% of the final grade). You must receive at least a grade of 4,0 both for the term paper and the oral examination to pass the module examination.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

Credit points are awarded after successful completion of the final module examination. Participation in the final module examination requires that the student has previously completed an examination in the form of a presentation in which at least 50% of the attainable points have been achieved.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Thushyanthan Baskaran	RUB Faculty of Management and Economics

Module: Applied Econometrics with R				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Applied Econometrics with R	L + T	5	150 h

2 Language of instruction
English

3 Contents of the module
Econometrics allows to analyze data sets characterizing economic problems in a quantitative manner. To that end, economic models are cast into econometric models, which can then be applied to the economic data at hand. Two of the most important econometric models are the univariate and multivariate linear regression models, whose properties and underlying assumptions are discussed in detail. Remedies for violations of the assumptions are likewise discussed. A short overview of time series models is likewise given. These models are then implemented in the software package R, using existing and creating new code, and applied to artificially created and actual data sets. Results are analyzed and described.

4 Competences
Participants should be enabled to distinguish different econometric models and explain their respective properties. They should apply these models to various economic and other data sets and interpret the results. In a situation where violations of certain assumptions are found, they should choose an appropriate approach and decide how to implement it. In the programming exercises, which use the software package R, students are supposed to apply code from pre-existing packages and develop new code based on the methodology studied in the course. Participants should be able to analyze and interpret their program outputs.

5 Examinations
Final grade is the grade of the final exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
–None. However, basic knowledge of regression analysis and analytical statistics is strongly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Vasyl Golosnoy	RUB Faculty of Management and Economics

<table>
<tr><td colspan="5">Module: Applied Time Series Analysis</td><td>ME6</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Summer semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
10</td><td>Time
300 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Applied Time Series Analysis</td><td>L + T</td><td>10</td><td>300 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
This course provides the review of time series models widely applied in economics and finance. Starting from univariate linear ARMA models we consider a broad class of linear and non-linear time series approaches (including ARIMA, GARCH, VARMA, etc.) with focusing on estimation and forecasts.</td></tr>
<tr><td>4</td><td colspan="5">Competences
Participants should understand and make use of modern time series techniques in empirical research.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Final grade is the grade of the final exam.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
None. However, at least one graduate course in Econometrics is strongly recommended.</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. Vasyl Golosnoy</td><td colspan="3">Responsible Department
RUB Faculty of Management and Economics</td></tr>
</table>

Module: Business Cycle Analysis and Forecasting					**ME5 & ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h	

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
		Business Cycle Analysis and Forecasting	L	10	300 h
2	**Language of instruction** English				
3	**Contents of the module** Business cycle forecasting is an important contribution to effective planning, e.g. in businesses and government agencies. For this reason, this course covers essential techniques for forecasting economic variables. Students will learn to identify important properties of the data that have to be included in the forecasting model. In addition, elementary forecasting techniques and econometric models will be introduced in this course. Finally, we discuss approaches to modify and adjust model-based forecasts using expert knowledge.				
4	**Competences** Students in this class will learn the skills to do business cycle forecasting, to estimate different econometric models, to compare forecasting models and to assess the forecasting performance of a model.				
5	**Examinations** Written Exam				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** None.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Torsten Schmidt		**Responsible Department** RUB Faculty of Management and Economics		

Module: Data Analysis Using R				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Data Analysis Using R	S	10	300 h

2 Language of instruction
English

3 Contents of the module
The module is divided into two parts. In the first half of the semester, students learn the basics and core components of data analysis with R in a lecture. The lecture covers the most important steps of data analysis projects: from importing and preparing raw data, explorative data analysis and visualization, formulating the empirical model to communicating the results. Practical examples show how these steps can be implemented using a set of R packages known as the tidyverse. In addition, it will be shown how to generate reports in R using the open-source scientific and technical publishing system Quarto. A special focus of the lecture is to introduce students to collaboration via version-controlled remote repositories. For this purpose, students will be shown how to create and manage a repository using GitHub. In the second half of the semester, students will work independently in groups on their own data analysis project. Based on the content of the lecture, a GitHub repository will be created in group work, which the students will use to prepare a data set and perform an econometric analysis. At the end of the semester, the students will share the results of their work in a presentation created with Quarto.

4 Competences
The module aims to enable students to conduct their own empirical projects using the statistical software R. By the end of the module, the students will be equipped with the necessary skills to independently conduct and manage empirical projects outside of this course, such as a master thesis. Students will also learn how to use git repositories for version control and collaboration, preparing them for possible careers in data analytics after graduation. By presenting the results of the project to their fellow students, the students can further improve their skills in in scientific presentation and time management.

5 Examinations
The final module examination consists of a presentation and the submitted code repository. Both, presentation and code, count equally towards the final grade.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, basic knowledge of the statistical software R is assumed. Course materials for an introduction to R are provided and can be studied on your own.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Thomas K. Bauer	RUB Faculty of Management and Economics

Module: Introduction to Empirical Macroeconomics					**ME6**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Introduction to Empirical Macroeconomics	L	10	300 h

2 Language of instruction
English

3 Contents of the module
Macroeconomics is about analyzing and forecasting economic developments at the national and international level. Related to this, it is often of great importance to quantify the effects of economic shocks and economic policy measures on macroeconomic variables, like GDP and employment. A crucial topic is therefore the identification and quantification of relationships between macroeconomic variables. The primary objective of this course is to provide an overview of methods suitable for this task. It is necessary to start with an introduction to the main macroeconomic models and the related data. However, the main focus is on the application of econometric methods.

4 Competences
Analytical and logical thinking, critical reflection on the methods used.

5 Examinations
Written exam (90 min)

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Torsten Schmidt	RUB Faculty of Management and Economics

Module: Econometric Evaluation of Economic Policies				**ME6**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Econometric Evaluation of Economic Policies	L	5	150

2 Language of instruction

English

3 Contents of the module

Tight public budgets increase the need to learn more about the effectiveness and efficiency of public policy measures. The empirical evaluation of these policies, however, is connected with difficult methodological problems. This module discusses the newest developments in the literature on the empirical evaluation of economic policy measures. A lecture introduces the basic concepts. Central contributions to the literature will be presented by the students themselves and discussed by the participants in a detailed way.

4 Competences

After participation, the students should be able to understand the newest econometric techniques developed for the evaluation of economic policies. They should understand their basic identification strategy, the necessary data to implement these strategies as well as the main problems of these strategies. The module aims to give the students the necessary skills to read and understand the scientific literature in this area and to give a critical assessment of empirical evaluation studies.

5 Examinations

The final module examination consists of a presentation or a written exam. The final grade corresponds to the grade of the presentation or the written exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, advanced knowledge of empirical research and/or econometrics is recommended.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Thomas K. Bauer	RUB Faculty of Management and Economics

Module: Machine Leaning and Programming in Python					**ME6**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Machine Leaning and Programming in Python	L	5	150

2 Language of instruction
English

3 Contents of the module
The module deals with basic and advanced models and methods from data science. The focus is on applications of the methods in the field of economics. Using the programming language Python, numerical datasets and text data are analysed and machine learning/ deep learning models are developed. Topics include regularisation, supervised learning, classification, decision trees, random forests, unsupervised learning, k-means clustering, deep learning, neural networks, natural language processing.

4 Competences
In this module, students get to know basic and advanced models and methods from data science. The techniques are applied using the programming language Python. After successfully completing the module, students are able to understand a wide variety of methods of machine learning/ deep learning/ neural networks. They can develop models that implement procedures in Python, understand methods of natural language processing, analyse numerical datasets and text data, and understand applications of machine learning models in economics

5 Examinations
The final module examination consists of a presentation or a written exam. The final grade corresponds to the grade of the presentation or the written exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, advanced knowledge of empirical research and/or econometrics is recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Astrid Krenz	RUB Faculty of Management and Economics

Module: Quantitative Regional Economics					**ME6**
M.Sc. Program: Econometrics					
Frequency Every Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Seminar Quantitative Regional Economics	S	5	

2 Language of instruction
English

3 Content of the Module

- Comprehensive overview about empirical regional economics a
- geographical data and public data
- Application of methods in R
- Analysis of data in R
- Regression analyses
- Visualization of geographical relations
- Development of a regional economic question
- Working on a regional economic question and application of quantitative methods
- Creation of a presentation as a dynamic document containing the results in LaTeX

4 Competences
Students shall be able to gain an overview about the methods of regional research. They shall work with geographical data, process the data in R and show application of the methods of investigation in R. Results shall be analyzes, discussed and presented. The students are expected to program all analyzes and visualize results accordingly. The complete process of developing a research question, documenting and programming, and visualization of the results have to be shown in a final presentation.

5 Examinations
The final module grade results from the grade of an individually held presentation which contains the development, processing and the results of the chosen research question. Credit points are awarded after successful completion of the final module examination and an obligatory hand-in of the presentation's program code.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Modulbeauftragte/r: Prof. Dr. Michael Roos Lehrende: Dr. Imke Rhoden	RUB Faculty of Management and Economics

Module: Seminar in Microeconometrics				**ME6**
M.Sc. Program: Econometrics				
Frequency As offered	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Seminar in Microeconometrics	S	10	300 h

2 Language of instruction
English

3 Contents of the module
This module deals with the econometric analysis of micro data. The first lectures will review the basic econometric methods and introduce the participants into the software package STATA. Afterwards, the students work on their own empirical project. As part of this project, the students review the relevant literature, identify their research question, prepare the underlying data, and empirically analyze the data by applying basic and advanced econometric methods. The results of the projects are presented to the class and documented in a term paper.

4 Competences
By the end of this course, students should be able to understand and evaluate empirical studies based on micro data and to conduct small empirical projects independently. Based on their analyses, students should learn to write a scientific paper and to present their research results to the class.

5 Examinations
The final module examination consists of a term paper (20 pages). Additional study achievements can be acquired through an oral presentation and discussion, for which bonus points can be awarded. A maximum of 25% bonus points will be awarded for the presentation. The best grade can only be achieved, if the student has earned bonus points. The bonus points will not be credited if the final module examination would have not been passed without bonus points.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, advanced knowledge of empirical research and/or microeconometrics is strongly recommended. Basic knowledge of STATA is helpful.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Thomas K. Bauer	RUB Faculty of Management and Economics

Module: Financial Econometrics				**ME7**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Financial Econometrics	L + T	10	300 h

2 Language of instruction
English

3 Contents of the module
This course provides the review of empirical methods applied in a quickly growing field of financial econometrics. The course concentrates on describing and modelling stylized facts found in return and volatility time series. The important financial models (CAPM, APT) are discussed from the empirical point of view as well.

4 Competences
Participants should understand and make use of modern econometric techniques for modelling financial processes.

5 Examinations
Final grade is the grade of the final exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, at least one graduate course in Econometrics is strongly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Vasyl Golosnoy	RUB Faculty of Management and Economics

<table>
<tr><td colspan="5">Module: Introduction to Artificial Intelligence</td><td>ME7</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Summer semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
5</td><td>Time
150 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Introduction to Artificial Intelligence</td><td>L + T</td><td>5</td><td>150 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
This course gives an overview over representative methods in artificial intelligence: formal logic and reasoning, classical methods of AI, probabilistic reasoning, machine learning, deep neural networks, computational neuroscience, neural dynamics, perception, natural language processing, and robotics.</td></tr>
<tr><td>4</td><td colspan="5">Competences
After successful completion of this course, students will be able to
• summarize a number of fundamental methods in artificial intelligence,
• explain their mathematical basis and algorithmic nature,
• apply them to simple problems,
• decide which methods are suitable for which problems, and
• communicate about the above aspects in English.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
The final module examinations consist of a written exam. The final grade corresponds to the grade of the written exam.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
None.</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="3">Module Coordinator
Prof. Dr. Laurenz Wiskott</td><td colspan="2">Responsible Department
RUB Faculty of Computer Science</td></tr>
</table>

Module: Introduction to Microeconometrics				**ME6**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Introduction to Microeconometrics	L + T	5	150 h

2 Language of instruction
English

3 Contents of the module
This module deals with the advanced analysis of econometric methods applicable to micro data. In particular, discrete choice and selection models as well as advanced empirical evaluation methods are covered. Within the lecture, the participants are introduced to the theoretical concepts of the methods.

4 Competences
By the end of this course, students should be able to understand and evaluate empirical studies based on micro data and to be proficient in the subject-related terminology. Moreover, they should have the ability to choose the right empirical strategy based on a given dataset/problem.

5 Examinations
The final module examinations consist of a written exam. The final grade corresponds to the grade of the written exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, advanced knowledge of empirical research and/or econometrics is recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Thomas K. Bauer	RUB Faculty of Management and Economics

Module: Multivariate Statistical Methods					**ME7**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 10	**Time** 300 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Multivariate Statistical Methods	L + T	10	300 h

2 Language of instruction
English

3 Contents of the module
This course provides the review of multivariate statistical methods, e.g. principal component analysis, factor analysis and discriminant analysis, which are of great importance in empirical economic research.

4 Competences
Participants should understand and make use of different multivariate statistical methods and apply them to economic and other data sets. In the written exercises, methods are applied, compared and evaluated. In the programming exercises, which use the software package R, students are supposed to apply code from pre-existing packages and develop new code based on the methodology studied in the course. Participants should be able to analyze and interpret their program outputs.

5 Examinations
Final grade is the grade of the final exam.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, basic knowledge of regression analysis and analytical statistics is strongly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator
Prof. Dr. Vasyl Golosnoy

Responsible Department
RUB Faculty of Management and Economics

<table>
<tr><td colspan="5">Module: Seminar in Econometrics</td><td>ME7</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Every semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
10</td><td>Time
300 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Seminar in Econometrics</td><td>S</td><td>10</td><td>300 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
The seminar provides a broad spectrum of topics to choose, primarily (but not only!) in the fields of macroeconomics, financial econometrics and time series econometrics. Participants are supposed to write a term paper of at most 20 pages and to present it at the end of the semester.</td></tr>
<tr><td>4</td><td colspan="5">Competences
Participants should learn to comprehend, compare and summarize one or multiple sources on a particular topic, which can either be parts of textbooks or original research articles. They should rephrase and organize the main aspects of the topic, and, in a possible application, analyze a data set or discover the properties of a particular statistical or econometric approach, as well as evaluate their results</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Oral examination. Participation in the oral examination requires that a term paper is submitted until the due date, and that the submitted term paper would suffice to receive a passing grade.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
None. However, at least one graduate course in Econometrics is strongly recommended.</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. Vasyl Golosnoy</td><td colspan="3">Responsible Department
RUB Faculty of Management and Economics</td></tr>
</table>

Module: Seminar in Applied Economic Policy					**ME5**
M.Sc. Program: Econometrics					
Frequency Every semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 5	**Time** 150 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Applied Economic Policy	S	5	150 h

2 Language of instruction

English

3 Contents of the module

After one kick-off meeting at the beginning of the semester, the students should work independently (and in consultation with their supervisors) on current economic policy topics. They should present the relevant research in this area and understand the empirical strategies involved in answering policy-relevant questions. The results of their research should be presented and discussed in a two-day block seminar, and summarized in a seminar paper, including the discussion results.

4 Competences

The aim of the seminar is to improve the understanding of current economic problems and to provide insights into the theoretical and empirical analysis of political decisions. Students should learn to develop concrete research questions independently and to understand and evaluate empirical strategies for answering politically relevant questions. The seminar is intended to enable students to independently produce scientific papers and to give them the opportunity to practice their presentation skills.

5 Examinations

The final module examination consists of a term paper. By giving a presentation and participating in the discussion, bonus points can be awarded, which amount to a maximum of 25% of the maximum total number of points. A maximum of 75 points can be achieved through the seminar paper, a maximum of 20 bonus points through the presentation and a maximum of 5 bonus points for participation in the discussion. The module score then results from a scale of points ranging from zero to 100 points. Bonus points earned have no influence on the examination result if it is "not passed" (5.0) without the bonus points.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, sound understanding of basic econometrics is strongly recommended.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Dr. h.c. Christoph M. Schmidt	RUB Faculty of Management and Economics

Compulsory Elective Courses –TU Dortmund University

<table>
<tr><td colspan="5">Module: Applied Economics I</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Programme: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter semester</td><td>Duration
1 Semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
7.5</td><td>Time
225 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the Module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td>1</td><td>Applied monetary economics</td><td>L + T</td><td>7.5</td><td>4</td></tr>
<tr><td>2</td><td>Seminar to Applied monetary</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
Deutsch/Englisch</td></tr>
<tr><td>3</td><td colspan="5">Content of the Module
The module consists of two elements. Element 1 deals with the basics of dynamic general equilibrium models for the study of monetary relationships and their application to the analysis of optimal monetary policy. Element 2 deals with changing issues in applied monetary economics on the basis of current research literature in the form of a seminar.</td></tr>
<tr><td>4</td><td colspan="5">Competences
The module enables students to work on empirically relevant questions of monetary business cycle theory and their implications for the design of economic policy. Particular emphasis is placed on the integration of theoretical analysis, the methodological foundations of which are the focus of element 1, and its practical application to economic policy issues on the basis of current literature, which is dealt with in the seminar in element 2.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
In element 1, there is a graded partial performance in the form of a written examination (duration 60 minutes). In element 2, there is a graded partial performance in the form of a written assignment and an oral presentation.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
- none -</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="3">Module Coordinator
Prof. Dr. Ludger Linnemann</td><td colspan="2">Responsible department
TU Dortmund University, Department of Business and Economics</td></tr>
</table>

Module: Applied Economics III					**ME5**
M.Sc. Programme: Econometrics					
Frequency Summer semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Advanced business cycle analysis	L + T	7.5	4
2	**Language of instruction** English				
3	**Content of the Module** The lecture covers current quantitative business cycle theories cast in the form of dynamic stochastic general equilibrium models. Students will learn about the quantitative implications of modelling decisions used in state-of-the-art business cycle models, the analytical and numerical solution of models, as well as their uses for simulation and empirical evaluation of theories.				
4	**Competences** Students acquire the ability to solve and quantitatively evaluate dynamic stochastic general equilibrium models. In the exercises, students will practically learn how to use software tools for numerical solution, simulation, and evaluation of theoretical models. Thus, they will gain the methodological competence to participate in applied macroeconomic research.				
5	**Examinations** Written and graded exam covering the entire module (90 minutes).				
6	**Type of Examinations**				
	covering the entire module	Relating to individual courses			
7	**Requirements** - none -				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Ludger Linnemann	**Responsible department** TU Dortmund University, Department of Business and Economics			

Module: Internationale Wirtschaft I (Urban Economics)					**ME5**
M.Sc. Programme: Econometrics					
Frequency Winter semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Urban Economics	L + T	7.5	4

2 Language of instruction
English

3 Content of the Module
This course conveys the most important theoretical and empirical insights from urban economics and economic geography. Among others, it covers the following topics:
- Economic geography and path dependence
- The costs and benefits of cities, Zip's law
- Residential land use and regulations
- Spatial equilibrium models (e.g., the Rosen-Roback model)
- Urban economic growth and local policy
- Interregional policy competition
- Trends, causes and consequences of segregation within cities

4 Competences
In this course, students will learn about determinants for the persistent concentration of economic activity across space and the resulting consequences for regional inequality, the reasons and consequences for the sorting of firms and individuals across locations, as well as the drivers and effects of segregation within cities. The course will extensively review the most important theoretical models in urban economics, discuss state-of-the-art empirical evidence (and their identification strategies) as well as critically assess economic cohesion policies.

5 Examinations
Written and graded exam covering the entire module (90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none - An interest in microeconomics and econometrics is highly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Andreas Lichter	TU Dortmund University, Department of Business and Economics

Module: Internationale Wirtschaft II (International Economics)					**ME5**
M.Sc. Programme: Econometrics					
Frequency Winter semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	International Economics	L + T	7.5	4

2 Language of instruction
English

3 Content of the Module
This course analyzes drivers of international trade and puts a particular focus on the determinants and implications of the rising fragmentation of global production, i.e., the organization of production on an increasingly global scale. Among others, the course will comprise the following topics:
- Gains from trade and comparative advantage
- New trade theory and firm heterogeneity
- The fragmentation of production: domestic and foreign in- and outsourcing
- Imperfect contracts in international trade and foreign direct investment
- The importance and operating modes of multinational firms

4 Competences
In this course, students will learn about the drivers and consequences of international trade. Particular emphasis will be paid to the rising fragmentation of global production. After participation in this course, students will be familiar with the key theoretical insights from new trade theory and will be able to explain determinants and consequences of the continuing unbundling of the production process. Students will have further gained insights into the organizational modes of multinational firms from both a theoretical and empirical perspective.

5 Examinations
Written and graded exam covering the entire module (90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none - An interest in microeconomics and econometrics is highly recommended.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Andreas Lichter	TU Dortmund University, Department of Business and Economics

Module: Internationale Wirtschaft III (Selected Topics in International Economics)					**ME5**
M.Sc. Programme: Econometrics					
Frequency Winter semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Selected Topics in International Economics	S	7.5	4
2	**Language of instruction** English				
3	**Content of the Module** This seminar covers selected, policy-relevant topics in international economics. Each term, the focus will be put on a different topic. Examples include, among others: (i) the extent and consequences of tax avoidance and evasion in a globalized world, (ii) drivers and consequences of migration, (iii) labor market effects of globalization, (iv) the effects of tariffs and trade wars. Students will critically assess state-of-the-art research, put existing empirical evidence into perspective, and think about the policy implications of discussed research. After two initial lectures to set the floor, students will work independently on a given topic and discuss their results at the end of the term in front of all course participants. Throughout the term, regular meetings for guidance and feedback by the advisors will be offered.				
4	**Competences** Students of this seminar will acquire the skills to critically assess and discuss state-of-the-art research in economics. Students will learn to critically summarize and discuss economic research and put the results of single papers into perspective, both by relating to other existing evidence and real-life examples. The seminar also prepares students for their Master's thesis, to which suitable topics may be extended.				
5	**Examinations** Module examination, consisting of a graded written paper, oral presentations and active participation (attendance is compulsory) in both, seminar sessions and oral presentations.				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none - An interest in microeconomics and econometrics is highly recommended.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Andreas Lichter		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Öffentliche Finanzen I (Economic Analysis of Law)					**ME5**
M.Sc. Programme: Econometrics					
Frequency Winter semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Economic Analysis of Law	L + T	7.5	4
2	**Language of instruction** English				
3	**Content of the Module** This course provides an introduction to the economic analysis of law, i.e., the application of economic methods to analysis of legal rules and institutions. It covers the areas of tort law, contract law and criminal law, property law and the Coase Theorem, intellectual property law, among others. The focus of the lectures will be primarily on theoretical work. Practice exercises will be assigned during the semester.				
4	**Competences** Students leave the course understanding how microeconomic theory can be used to critically evaluate law and public policy. The course should prove useful for any student interested in analyzing policy issues. It will be particularly valuable background for those students intending to specialize in public economics, political economy and economic policy.				
5	**Examinations** Written and graded exam covering the entire module (90 minutes).				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** None. However, the course requires successful participation in microeconomics and game theory courses.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Galina Zudenkova, Ph.D.		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Wirtschaftspolitik I (Labor Economics)					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Labor Economics	L + T	7.5	4
2	**Language of instruction** English				
3	**Content of the Module** This is a first comprehensive course in labor economics at the graduate level. Topics include supply- and demand for labor, wage determination, human capital, technological change, market power, the role of firms and inequality. There will be a special focus on evidence accompanying the theory as well as the causal and quantitative empirical methods used in applied microeconomics more generally.				
4	**Competences** The course fosters participants' skills in (i) the economic modeling of labor market relationships; (ii) their knowledge of microeconometric methods; (iii) hands-on data analysis and communication of empirical results.				
5	**Examinations** Graded written exam (90 minutes) or oral exam (30 minutes) covering the entire module (mode will be announced in time).				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** -None-				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Michael Böhm, Ph.D.		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Wirtschaftspolitik III (Economic Policy)					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Seminar on Economic Policy	L + E	7.5	4

2 Language of instruction

English

3 Content of the Module

The seminar covers economic issues that are currently a focus of debate in academia and in the public sphere. Students work on hands-on research questions in the fields of labor markets, industrial economics, and related areas. There will be opportunities to work empirically, theoretically, or to synthesize an existing body of research. Students are also given regular guidance by their advisor and have the opportunity to present their progress on various occasions.

4 Competences

Students acquire analytical, empirical, and writing skills in applied microeconomics. They are acquainted with the research frontier and current debate in a policy-relevant area. The seminar also prepares students for the master's thesis, to which suitable topics may be extended.

5 Examinations

Module examination, consisting of a graded written term paper and an oral presentation of the results.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

-None-

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Michael Böhm, Ph.D.	TU Dortmund University, Department of Business and Economics

Module: Makroökonomie I (Economic Growth and Historical Development)					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Economic growth and historical development	L + T	7.5	4

2 Language of instruction
English

3 Content of the Module
Why are some countries rich and others are poor? This course provides an understanding of long-run development and studies the underlying causes of income differences across countries. The focus of the lectures is the theoretical and conceptual background of proximate and fundamental factors in economic growth and development. In the exercise classes, empirical articles will be discussed with a focus on causal inference based on historical data.

4 Competences
Students learn to understand and discuss long-term economic relationships and developments. They also learn to apply their knowledge of empirical methods to articles that conduct quantitative analysis, to discuss and to critically assess these. Understanding past (historical) growth episodes, helps to inform policy on how to achieve economic growth and sustained development.

5 Examinations
Graded written exam (90 minutes) or oral exam (15-30 minutes) covering the entire module (mode will be announced in time)

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
-none- Recommended: basic knowledge of macroeconomics and econometrics

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
JProf. Dr. Nina Boberg-Fazlic	TU Dortmund University, Department of Business and Economics

<table>
<tr><td colspan="5">Module: Makroökonomie III (Regional Disparities)</td><td>ME5 & ME6</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter Semester</td><td>Duration
1 Semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
7.5</td><td>Time
225 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the Module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td>1</td><td>Regional Disparities</td><td>L + T</td><td>7.5</td><td>4</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Content of the Module
The lecture starts with a short introduction to causal graphs and their importance in economic modelling. Afterwards, students will have the possibility to advance their knowledge in structural econometrics, such as GMM estimation and Maximum Liklihood Inference. The remaining part of the class will introduce students to state of the art research in regional economics with an explicit structural estimation design. Furthermore, participants of the class will be able to get hands-on experience in Dynamic Discrete Choice Models.</td></tr>
<tr><td>4</td><td colspan="5">Competences
This class is designed for advanced master students and graduate students who are willing to advance their knowledge in the approaches of structural estimation.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Graded written exam (90 minutes) or oral exam (15-30 minutes) covering the entire module
(mode will be announced in time)</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
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<tr><td>7</td><td colspan="5">Requirements
-none- Recommended: basic knowledge of macroeconomics and econometrics</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="3">Module Coordinator
Prof. Dr. Philip Jung</td><td colspan="2">Responsible department
TU Dortmund University, Department of Business and Economics</td></tr>
</table>

Module: Makroökonomie IV (Macroeconomics)					**ME5**
M.Sc. Programme: Econometrics					
Frequency Winter semester		**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Dynamic macroeconomics	L + T	7.5	4
2	**Language of instruction** English				
3	**Content of the Module** This module presents methods and core applications of modern dynamic macro-economic theory. Main topics are consumption and savings choices in incomplete markets, pricing of risky and riskless assets and applications to (optimal) fiscal policy and (search) theory of frictional labor markets.				
4	**Competences** The module provides tools and main results in modern dynamic macroeconomics on an advanced level to enable students to conduct their own research in macroeconomics.				
5	**Examinations** Graded written exam (90 minutes) or oral exam (30 minutes) covering the entire module (mode will be announced in time).				
6	Type of Examinations				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none -				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Philip Jung		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Makroökonomie V					**ME5**
M.Sc. Programme: Econometrics					
Frequency Winter semester		**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Chancen und Grenzen ökonomischen Wachstums	L + S	7.5	4
2	**Language of instruction** German/English				
3	**Content of the Module** This module analyses economic growth both theoretically and empirically. The results are discussed in the context of the current economic and political debate. Specific questions are: What is growth? How does growth come about? To what extent are growth and prosperity connected? What are the limits to growth? How does green growth work? How can (and should) politics influence growth?				
4	**Competences** Students repeat the relevant methodologies from macroeconomic research and are able to apply these to the questions posed. They understand and practise academic discourse. They will be able to critically analyze the topic and develop their own statements and policy recommendations in relation to the issues raised.				
5	**Examinations** There is a graded module examination. This consists of a presentation including a written paper as well as oral participation and attendance (i.e. compulsory attendance).				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none - Knowledge of macroeconomics at Bachelor level is expected. Knowledge of growth at Bachelor level is an advantage.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Almut Balleer		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Mikroökonomie I (Microeconomics)					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Game Theory	L + T	7.5	4

2 Language of instruction
English

3 Content of the Module
This course provides an introduction to game theory, i.e., the description of strategic behavior in situations in which the own payoff depends on the behavior of others. As such, game theory can be applied to analyze and understand strategic situation of various kinds, e.g. in employment situations, R&D, market competition, or market design but also in politics, sports, or biology.
The primary focus of the course is to provide the theoretical tools to analyze such situations and enable the advanced study of strategic behavior. In exercises, we will also apply these methods to stylized strategic mostly business-related situations.

4 Competences
The course enables students to understand the mathematical „language" of game theory and to apply it to describe complex strategic situations. This enables students to think through optimal behavior in many types of business situations, but also to understand the academic literature in fields like applied microeconomics (e.g., industrial organization, contract theory, mechanism design), public economics (e.g., social insurance, tax systems), or politics (e.g. voting behavior, theories of conflict).

5 Examinations
Graded written exam (90 minutes) or oral exam (15-30 minutes) covering the entire module (mode will be announced in time)

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
-None- Recommended: Basic understanding of economic

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Lukas Buchheim	TU Dortmund University, Department of Business and Economics

Module: Narrative Economics and the Media					**ME5**
M.Sc. Programme: Econometrics					
Frequency Summer semester	**Duration** 1 Semester	**Study section** 2nd to 4th semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Narrative Economics and the Media	L + S	7.5	4

2 Language of instruction
English

3 Content of the Module
This seminar focusses on the interplay between markets, economic policy and the public sphere. The narrative economic approach conceptualizes how shared beliefs influence collective economic behavior and economic policy. Since the media play an important role in forming and reinforcing economic narratives, their role is of particular interest. Concepts from communication science, like agenda setting, framing, news values, and journalistic quality, are applied to economic issues. The lecture part of the module introduces the students to concepts of narrative economics and public communication. In the seminar part students present their term papers on specific economic policy issues

4 Competences
Students will learn to systematically analyze public discourses on economic and economic policy issues. As public attention tends to be short-lived, while many economic problems require structural long-term solutions, they are acquainted with strategies to reconciling the two, which is at the core of the practical conduct of economic policy.

5 Examinations
Module examination, consisting of a graded written paper, an oral presentation and active participation (attendance is obligatory).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
-None- Recommended: bachelor level knowledge of micro and macroeconomics, public finances, monetary policy, vivid interest in current economic policy issues

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Henrik Müller	TU Dortmund University, Kulturwissenschaften

Module: Seminar Microeconomics				**ME5**
M.Sc. Program: Econometrics				
Frequency Winter Semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1	Seminar Microeconomics	S	7.5	4

2 Language of instruction
English

3 Content of the Module
This course introduces students to the research areas of the Chair of Microeconomics that are located at the intersection of (empirical and theoretical) microeconomics and macroeconomics. These topics include, but are not limited to, the theory and empirics of expectation formation as well as the study of regional economic developments.

4 Competences
Students will learn how microeconomic and macroeconomics tools are used jointly to answer business and policy relevant questions regarding how economic agents form expectations or how regional markets evolve.
Students will also learn how to formulate working hypotheses, and evaluate their strengths and weaknesses. Effective communication of arguments will be one key learning outcome of the course.
In addition, students will acquire analytical tools to critically evaluate theoretical and empirical work, and to possibly add to the existing work with own analyses that may provide the foundation for work on a Master's thesis.

5 Examinations
Module examination, consisting of a graded written paper (counts for 50 % of the grading) and an oral presentation (counts for 50 % of the grading). Participation is required (i.e., compulsory attendance).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
-none- recommended: knowledge of introductory economics (Microeconomics, Macroeconomics, Econometrics) at the Bachelor level

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Lukas Buchheim	TU Dortmund University, Department of Business and Economics

Advanced Topics in Applied Econometrics						**ME6**
M.Sc. Program: Econometrics						
Frequency Each semester		**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 4.5 / 3		**Time** 135h / 90h
1	**No.**	**Module**	**Type**	**Credit Points**		**Credit Hours**
	1	Machine Learning for Economic Data	L + T	4.5		3
	2	Programming with Julia	L + T	3		2
	3	Programming with Python	L + T	3		3
	4	Programming Course with R	L + T	3		3
	5	Programming with SAS	L + T	3		3
	6	Einführungskurs in SQL und APIs	L + T	2		2
2	**Language of instruction** English or German					
3	**Contents of the module** *Note: more than one of the above courses can be credited.* These modules cover various topics in applied econometrics. In general, more than one lecture is taught each semester.					
4	**Competences**					
5	**Examinations** Graded oral exam or graded written exam. The lecturer may include further requirements necessary to attend the final exam. These requirements and the form of the examination will be announced at the beginning of the course.					
6	**Type of Examinations**					
	covering the entire module		Relating to individual courses			
7	**Requirements** - none -					
8	**Status of the Module** Elective module in M.Sc. Econometrics					
9	**Module Coordinator** Lecturers from TU Dortmund University, Department of Statistics		**Responsible Department** TU Dortmund University, Department of Statistics			

Module: Advanced R: Theory, Concepts, and Paradigms					**ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester		**Duration** 1 Semester	**Study section** 2nd semester	**Credits** 4.5	**Time** 105 h
1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credits**	**Credit Hours**
	1	Advanced R: Theory, Concepts, and Paradigms	L + T	4.5	4
2	**Language of instruction** Deutsch / Englisch				
3	**Contents of the module** Advanced R teaches Rs underlying programming paradigms. In the course data type and structures in R as well imperative programming, object oriented programming and functional programming in R are discussed.				
4	**Competences** Student learn to use R to write programs that are easily readable and utilize all of R's capabilities optimally.				
5	**Examinations** 2 practical tests during the semester (25% of final grade each) and 1 final written exam (50% of final grade)				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - keine -				
8	**Status of the Module** Wahlmodul im Masterstudiengang Econometrics				
9	**Module Coordinator** Dr. Daniel Horn		**Responsible Department** TU Dortmund University, Department of Statistics		

Module: Advanced Text Mining Methods					**ME6 & ME7**
M.Sc. Program: Econometrics					
Frequency As offered	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit Hours
1		L + T	7.5	4

2 Language of instruction
English

3 Content of the Module
This module deals with complex text mining methods and models which can, for instance, be used to extract information from economic texts. Using the skills acquired in the lecture "Text as Data", the students can choose either a more theory- or practice-focused project. Theory-focused projects are centered around literature review to give the student a deep understanding of the advantages and disadvantages as well as the use cases of different models. In practice-focused projects, students are given specific task suitable for text data analysis to solve. The results are presented at the end of the semester and formalized in a written report.

4 Competences
By the end of this seminar, the students should have a deeper understanding of different versions of common text mining methods and be able to use them in empirical projects. In addition, the students can improve their skills required for scientific reports and presentations.

5 Examinations
Reports as well as presentations.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
Basic knowledge about the most common text mining methods (Latent Dirichlet Allocation, Word2Vec) are expected, but not required if the student is willing to acquire the basics themselves.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator
Prof. Dr. Carsten Jentsch

Responsible department
TU Dortmund University, Department of Statistics

Module: Applied Economics II					**ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester		**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credits** 7.5	**Time** 225 h

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credits**	**Credit Hours**
	1	Applied Macroeconometrics	V+Ü	7.5	4
2	**Language of instruction** Deutsch / Englisch				
3	**Contents of the module** Das Modul befasst sich mit Theorie und Praxis der modernen Makroökonometrie. Behandelt werden zeitreihenanalytische Methoden, mit denen die dynamischen Zusammenhänge zwischen den wichtigsten makroökonomischen Indikatoren abgebildet werden können. Ziel ist es, empirisch gestützte Aussagen zu Ursache-Wirkungszusammen-hängen zu gewinnen, und die Resultate zur Beurteilung der empirischen Plausibilität von Theorien sowie zur Prognose und der Simulation von wirtschaftspolitischen Eingriffen zu nutzen.				
4	**Competences** Das Modul macht den Studierenden die wichtigsten Methoden der angewandten makroökonometrischen Forschung zugänglich, und befähigt sie so, theoretisch und/oder wirtschaftspolitisch relevante Fragestellungen anhand von Zeitreihendaten zu bearbeiten, empirische Studien kritisch zu beurteilen und eigene empirische Projekte selbständig zu bearbeiten. Hierbei wird besonderes Gewicht auf die Vermittlung der notwendigen methodischen Competences gelegt. Diese werden anhand von computergestützten Übungen anhand von einschlägigen Softwarewerkzeugen erworben und vertieft.				
5	**Examinations** Es findet eine benotete Modulprüfung entweder in Form einer Klausurarbeit (Dauer 90 Minuten) oder in Form einer mündlichen Prüfung (Dauer 20 Minuten) statt. Die Art der Prüfung wird rechtzeitig bekannt gegeben.				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - keine -				
8	**Status of the Module** Wahlmodul im Masterstudiengang Econometrics				
9	**Module Coordinator** Prof. Dr. Ludger Linnemann		**Responsible Department** TU Dortmund University, Department of Business and Economics		

Module: Econometric Forecasting					**ME6 & ME7**
M.Sc. Program: Econometrics					
Frequency As offered	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit Points** 4.5	**Time** 135 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1		L + T	4.5	3
2	**Language of instruction** English				
3	**Content of the Module** This course provides a comprehensive introduction to the forecasting of (economic) time series, focusing on the theoretical background of applied forecasting. To this end, we study in detail the linear predictive regression model, including special topics like mixed-frequency data, regressor persistence, high-dimensional predictors, and also more advanced topics like forecast intervals and long-horizon forecasts. The final part of the course covers forecast evaluation.				
4	**Competences** After successfully completing the course, you will understand the fundamental concepts of time series forecasting, and be able to identify and implement various time series forecasting techniques, as well as evaluate the performance of forecasting models.				
5	**Examinations** Graded oral exam.				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** Statistical Theory and Time Series Analysis are a must. Econometrics is useful but not a necessary condition.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Matei Demetrescu		**Responsible department** TU Dortmund University, Department of Statistics		

Module: Finance I					**ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit points** 7.5	**Time** 225 h	

1 Structure of the Module

No.	Courses	Type	Credit Points	Credit hours
1	Data and AI in Economics	L + T	7.5	4

2 Language of instruction
English

3 Content of the module
This course is designed to introduce students to the intersection of data science, artificial intelligence (AI), and economics. It aims to equip students with the necessary skills to apply AI and data analysis techniques to economic problems. The course will cover topics such as programming for data analysis, machine learning techniques, AI applications in economics, and ethical considerations in AI and data science.

4 Competences
By the end of this course, students should be able to:
- Understand the role of data and AI in economics and their potential applications.
- Apply programming and computational tools for data analysis in economic contexts.
- Understand and apply machine learning techniques to economic data.
- Understand the ethical implications of using AI and data science in economics.

The practical sessions are conducted using the industry's programming language (currently python).

5 Examinations
Written and graded exam covering the entire module (90 minutes) or graded presentation based on written case study's expose. The mode of the exam will be assigned at the beginning of the course.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None. However, knowledge in the programming language used (eg. Python), acquired e.g. by successful examination of Finance III (Financial Econometrics), is strongly recommended. Due to limited PC-capacities you need to register for this course.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible department**
Prof. Dr. Peter N. Posch	TU Dortmund University, Department of Business and Economics

Module: Finance III					**ME6**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit points** 7.5	**Time** 225 h	

1	**Structure of the Module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit hours**
	1	Financial Econometrics	L + T	7.5	4
2	**Language of instruction** English				
3	**Content of the module** This lecture applies modern econometric methods to current questions from the field of finance, risk-management and commodity markets. We will both explore the theoretical dimensions of the models used as well as apply the methods to real-life datasets.				
4	**Competences** Students learn the basic and advanced methods of financial econometrics. They apply the methods using datasets and thereby learn both the application of econometric methods as well as the caveats associated with real-life data, data gathering and data mining. The use of the industry specific programming language (currently Python) for econometric analysis is an essential part of this course.				
5	**Examinations** Graded presentation based on written case study's expose.				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** None. However, knowledge in statistical and econometrical methods, prior knowledge in finance, e.g. one of the modules, is strongly recommended. Due to limited PC-capacities you need to apply for this course.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Peter N. Posch		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Finance V					**ME6**
M.Sc. Program: Econometrics					
Frequency Each semester		**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit points** 7.5	**Time** 225 h

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit hours**
	1	Research Topics in Finance, Risk- and Resourcemanagement	S	7.5	4
2	**Language of instruction** English				
3	**Content of the module** In this course we will discuss current research topics including, but not limited to, the methods applied, the scope and aim of the research and its impact. We train quantitative analysis with concrete research questions and real datasets and increase the competency in academic writing and methodology.				
4	**Competences** Analytical and quantitative competences in the field of finance and risk management are trained. The seminar prepares students for the master thesis to which the topics can be (generally) extended. Literature research as well as the current state of the academic discussion in the topic's area furthermore deepens the student's competences in pursuing an academic training on a high level**.**				
5	**Examinations** Graded written paper and oral presentation.				
6	**Type of Examination**				
	covering the entire module		Relating to individual courses		
7	**Requirements** None. However, at least one master module in the area of finance and interest in the research topics in the field of finance, risk management and resource management or/and an application for writing the master thesis is strongly recommended.				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Peter N. Posch		**Responsible department** TU Dortmund University, Department of Business and Economics		

Module: Modern Methods in Survey Sampling					**ME6**
M.Sc. Program: Econometrics					
Frequency As offered		**Duration** 1 Semester	**Study section** 1st to 3rd semester	**Credit points** 4.5	**Time** 135 h

1	**Structure of the module**					
	No.	**Courses**	**Type**	**Credit Points**	**Credit hours**
	1	Modern Methods in Survey Sampling	L + T	4.5	3
2	**Language of instruction** English					
3	**Content of the module** The courses deal with cutting-edge methods and problems of survey statistics. They therewith provide up-to-date in-depth knowledge in specific, highly advanced subareas of the discipline and permit insight into topics of modern statistical research					
4	**Competences** Students learn about specific up-to-date problems and methods of survey statistics.					
5	**Examinations** Oral exam or Exam or thesis					
6	**Type of Examination**					
	covering the entire module		Relating to individual courses			
7	**Requirements** None. However, solid Knowledge of basics statistics and survey statistics are recommended; Depending on the topics covered possible further prerequisites will be communicated.					
8	**Status of the Module** Elective module in M.Sc. Econometrics					
9	**Module Coordinator** Prof. Dr Ralf Münnich		**Responsible department**			

Seminar in Applied Econometrics					**ME6**
M.Sc. Program: Econometrics					
Frequency Each semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 4	**Time** 120h	

1 Structure of the module

No.	Module	Type	Credit Points	Credit Hours
1	Bayesian Data Analysis	S	4	2
2				

2 Language of instruction
English or German

3 Contents of the module
Note: more than one of the above courses can be credited.

In this module each participant works with a scientific paper dealing with current topics of econometric research. The participants summarize the main content and results of the work in a written report and illustrate their finding in an oral presentation.

4 Competences
Participants gain practice in the presentation of the statistical results in written and oral form and expand their methodological skills.

5 Examinations
Written report and oral presentation. Details will be announced at the beginning of the course.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Lecturers from TU Dortmund University, Department of Statistics	TU Dortmund University, Department of Statistics

Advanced Topics in Econometric Methods					**ME7**
M.Sc. Program: Econometrics					
Frequency As offered	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 9 / 4.5	**Time** 270 h / 135 h	

1	No.	**Module**	**Type**	**Credit Points**	**Credit Hours**
	1	Advanced Bayesian Data Analysis	L + T	4.5	3
	2	Advanced Econometrics	L + T	9	6
	3	Advanced Statistical Learning	L + T	9	6
	4	Applied Bayesian Data Analysis	L + T	9	6
	5	Bayesian Econometrics	L + T	4.5	3
	6	Bayes-Statistik	L + T	9	6
	7	Bootstrap Methods	L + T	9	6
	8	Causality	L + T	4.5	3
	9	Decision Trees and their Optimization	L + T	4.5	3
	10	Econometric Forecasting	L + T	4.5	3
	11	Econometrics of treatment effects and policy evaluation	L + T	4.5	3
	12	Empirical processes	L + T	4.5	3
	13	Financial Econometrics	L + T	4.5	3
	14	Generalisierte Lineare Modelle	L + T	9	6
	15	Hidden Markov and State Space Models	L + T	4.5	3
	16	High-Dimensional Time Series Analysis	L + T	4.5	3
	17	Multiples Hypothesentesten	L + T	4.5	3
	18	Natural Language Processing	L + T	9	6
	19	Nonparametric and High-Dimensional Econometrics	L + T	4.5	3
	20	Panel data analysis I	L + T	4.5	3
	21	Panel data analysis II	L + T	4,5	3
	22	Robuste statistische Verfahren	L + T	9	6
	23	Robuste statistische Verfahren	L + T	4.5	3
	24	Sequentielle Verfahren	L + T	9	6
	25	Statistical Methods for Counting Processes	L + T	4,5	3
	26	Statistical Network Analysis	L + T	4.5	3
	27	Extremwertstatistik	L + T	4.5	3
	28	Stochastische Prozesse	L + T	9	6
	29	Survival Analysis	L + T	9	6
	30	Unit Root and Cointegration Analysis	L + T	9	6

2	**Language of instruction** English or German
3	**Contents of the module** *Note: more than one of the above courses can be credited.* These modules cover various research topics in modern econometrics. The mathematical background is extensively discussed using stochastic tools. In general, more than one lecture is taught each semester.

4	**Competences** Participants gain deeper knowledge in a specific area of econometric research. They gain insight in the theoretical background and derivation of econometric procedures and are able to adapt the methods in accordance to the desired settings. Based on the deeper understanding in a certain research field, the participants learn to handle and work with unknown procedures efficiently.	
5	**Examinations** Graded oral exam or graded written exam. The lecturer may include further requirements necessary to attend the final exam. These requirements and the form of the examination will be announced at the beginning of the course.	
6	**Type of Examinations** covering the entire module / Relating to individual courses	
7	**Requirements** - none -	
8	**Status of the Module** Elective module in M.Sc. Econometrics	
9	**Module Coordinator** Lecturers from TU Dortmund University, Department of Statistics	**Responsible Department** TU Dortmund University, Department of Statistics

Seminar in Econometrics					**ME7**
M.Sc. Program: Econometrics					
Frequency Each semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 4	**Time** 120h	

1 Structure of the module

No.	Module	Type	Credit Points	Credit Hours
1	Seminar in Econometrics	S	4	2
2	Seminar in Zeitreihenökonometrie	S	4	2
3	Resampling Verfahren	S	4	2
4	Time Series Econometrics	S	4	2

2 Language of instruction
English or German

3 Contents of the module
Note: more than one of the above courses can be credited.

In this module each participant works with a scientific paper dealing with current topics of econometric research. The participants summarize the main content and results of the work in a written report and illustrate their finding in an oral presentation.

4 Competences
Participants gain practice in the presentation of the statistical results in written and oral form and expand their methodological skills.

5 Examinations
Written report and oral presentation. Details will be announced at the beginning of the course.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Lecturers from TU Dortmund University, Department of Statistics	TU Dortmund University, Department of Statistics

Module: Maschinelles Lernen				**ME7**
M.Sc. Program: Econometrics,				
Frequency Nach Ankündigung	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credits** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credits	Credit Hours
1	Maschinelles Lernen	V	3	2
2	Übungen zu Maschinelles Lernen	Ü	3	2

2 Language of instruction
Deutsch

3 Contents of the module
Das Gebiet des maschinellen Lernens betrifft als Optimierung oder Funktionsapproximation eine Vielzahl von Aufgaben: Klassifikation und Clustering von Texten, Bildern und Musikstücken, Entdeckung auffälliger Teilräume in Daten, Analyse von Zeitreihen, Vorhersage von Beobachtungen, zusammenfassende Beschreibung von Messdaten... Grundlage ist die empirische und strukturelle Risikominimierung, aber auch logische Theorien (Stichwort: Induktion) können genutzt werden. Die Lernbarkeit von Konzepten wird in Bezug auf die Beispiele, die Repräsentationsklasse der Hypothesen und die erlaubten Operatoren untersucht. Neue Arbeiten berücksichtigen das Lernen aus verteilten Datensammlungen und aus Datenströmen unter Beschränkung des Speicherplatzes. Die Studierenden sollen an die in der Forschung diskutierten Fragestellungen herangeführt werden.

4 Competences
Die Studierenden lernen die grundlegenden Algorithmen des maschinellen Lernens so kennen, dass sie sie selbst implementieren können. Dadurch verstehen sie die in der aktuellen Literatur diskutierten alternativen Ansätze mit ihren Vor- und Nachteilen. In der Verbindung von Vorlesung und Übungen werden die (theoretischen) Eigenschaften der Algorithmen und ihre (praktischen) Auswirkungen deutlich, so dass die Studierenden dann eigenständig praktische Anwendungen von bekannten Lernverfahren in unterschiedlichen Feldern durchführen können.

5 Examinations
mündliche Prüfung (30 Minuten)
Studienleistungen: -keine-

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im Masterstudiengang Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. K. Morik	TU Dortmund University, Fakultät Informatik

Module: Wissensentdeckung in Datenbanken					**ME7**
M.Sc. Program: Econometrics,					
Frequency jährlich		**Duration** 1 Semester	**Study section** 1.-2. semester	**Credits** 8	**Time** 240 h

1 Structure of the module

No.	Courses	Type	Credits	Credit Hours
1	Wissensentdeckung in Datenbanken	V	6	4
2	Übungen zu Wissensentdeckung in Datenbanken	Ü	2	2

2 Language of instruction
Deutsch

3 Contents of the module
Wissensentdeckung in Datenbanken liegt im Schnittbereich von Datenbanken, Maschinellem Lernen und Statistik. Es geht darum, in sehr großen Datenbeständen Muster zu finden, die gemäß einem Qualitätsmaßes bewertet werden. Je nach den Vorgaben der Benutzer und dem Qualitätsmaß unterscheidet man die Lernaufgaben

- Klassifikation
- Clustering
- Subgruppenentdeckung
- Finden häufiger Mengen und Assoziationsregeln

Ausgehend von gegebenen Daten müssen in einer Folge von Vorverarbeitungsschritten die Daten für die Lösung der Lernaufgabe erstellt werden, wobei unterschiedliche Algorithmen zum Einsatz kommen. Dabei werden verschiedene Arten von Daten vorgestellt, z.B. binäre Datenbanken, Zeitreihen, zeitgestempelte Daten. Die formale Charakterisierung der Lernaufgabe und des Verfahrens muss algorithmisch so umgesetzt werden, dass sehr große Datenmassen schnell durchsucht werden, wodurch sich Approximationen an die gewünschte Lösung und heuristische Verkürzungen ergeben. In der Vorlesung werden für jede Lernaufgabe einige Algorithmen vorgestellt. Vorverarbeitungsketten werden exemplarisch anhand einiger realer Anwendungen diskutiert.

4 Competences
Auf der Grundlage statistischer Theorie und algorithmischer Umsetzungen sollen die Studierenden selbständig Anwendungen der Wissensentdeckung entwickeln und Zugang zu den Forschungsthemen haben können.

5 Examinations
mündliche Prüfung (30 Minuten) oder Klausur (120 Minuten)
Studienleistungen sind außerdem die aktive Mitarbeit in den Übungen und erfolgreiche Bearbeitung der Übungsblätter. Die Studienleistung ist Voraussetzung zur Teilnahme an der Modulprüfung.

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -
Vorausgesetzte Kenntnisse: Grundkenntnisse der Stochastik

8 Status of the Module
Wahlmodul im Masterstudiengang Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. K. Morik	TU Dortmund University, Fakultät Informatik

Compulsory Elective Courses – University of Duisburg-Essen

<table>
<tr><td colspan="5">Module: Advanced Industrial Organization</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Summer semester</td><td>Duration
1 semester</td><td>Study section
2nd semester</td><td>Credit Points
6</td><td>Time
150 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Advanced Industrial Organization</td><td>L + T</td><td>5</td><td>150 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
Fundamentals:
- Objects of Interest: Consumers, Firms, Markets
- Basic forms of competition: Perfect competition, Monopoly
Oligopoly Theory
- Static Models with Homogeneous Goods: Quantity Competition, Price Competition
- Product Differentiation: Horizontal Differentiation, Vertical Differentiation, Differentiation with Linear Demand
Advanced topics
- Innovation and R&D
- Two-sided Platforms</td></tr>
<tr><td>4</td><td colspan="5">Competences
Nach erfolgreicher Beendigung dieser Veranstaltung sind die Studierenden in der Lage
- oligopolistischen Wettbewerb auf den Märkten zu analysieren
- zwischen verschiedenen Formen des Wettbewerbs zu unterscheiden
- fortgeschrittene Konzepte und Modelle der IndustrieÖkonomik zu verstehen
- diese Kenntnisse auf realistischere Sachverhalte, wie z. B. Wettbewerbspolitik, anzuwenden</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Written 60-minute exam</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
- none -</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Eugen Kovac, Ph.D.</td><td colspan="3">Responsible Department
University of Duisburg-Essen, Mercator School of Management, Campus Duisburg</td></tr>
</table>

<table>
<tr><td colspan="5">Module: Data Science in Energy and Environment</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
As offered</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
6</td><td>Time
180h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td>1</td><td>Data Science in Energy and Environment</td><td>S</td><td>6</td><td>2</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
The purpose of this seminar is to provide an advanced understanding of modeling and forecasting methods in energy markets, esp. concerning probabilistic forecasting. The students apply sophisticated forecasting methods to real data (e.g. electricity or natural gas prices, electricity load, wind and solar power production) using the statistical Software R. They write a report and present their findings.
The focus of the seminar is placed especially on probabilistic forecasting with different applications in e.g. electricity price and electricity load or wind and solar power production forecasting. A particular attention is given to regression-based modeling methods for electricity market data.</td></tr>
<tr><td>4</td><td colspan="5">Competences
The students
- have an advanced understanding of forecasting concepts and techniques applied in energy markets
- will use statistical software R to fit estimation and forecasting algorithms to real world data
- can visualize and interpret obtained results</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Weighted average of a group R-project and a presentation (usually about 20 minutes).</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
- none -</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. Florian Ziel</td><td colspan="3">Responsible Department
University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen</td></tr>
</table>

Module: Energy Forecasting Competition					**ME5**
M.Sc. Program: Econometrics					
Frequency As offered	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Energy Forecasting Competition	L + S	6	4

2 Language of instruction

English

3 Contents of the module

In the first third of the Module the students study the competition design, the forecast evaluation methods, benchmark methods and forecasting principles in general in a lecture. The competition task and the corresponding data sets will be released immediately. In the second part the students construct their own forecasting model for the competition and submit their forecasts. Shortly afterwards the results will be released. In the third part of the students write a report on the prediction methods and present their finding

4 Competences

The students

- learn concepts to produce and evaluate probabilistic forecasts
- can produce forecasts using python or R for time series data from energy systems and markets
- learn basics about forecasting competitons
- learn characteristics of energy time series data sets (e.g. including energy consumption, energy prices, wind and solar production, etc.)
- learn to visualize, report and present results

5 Examinations

Weighted average of a group R-project and a presentation (usually about 20 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Florian Ziel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Electricity, Renewables and District Heating					**ME5**
M.Sc. Program: Econometrics					
Frequency winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Electricity, Renewables and District Heating	L	3	2 SWS
1b	Electricity, Renewables and District Heating	T	3	2 SWS

2 Language of instruction
English

3 Contents of the module

1. Subject and fundamental problems, research approaches including their meaning
2. Management of power generation incl. renewables: Power plants as an essential resource, power plant scheduling, supply and sales markets, portfolio management for power generation
3. Management of power transmission and distribution: Power-flow analysis, grid structure and operation, reserves, congestion management, grid usage – contract and billing principles, balancing, measurement and billing
4. Perspectives for future electricity systems: power plant investment and long-term equilibria in power markets, consequences of increased electricity generation from renewable energies, congestion management and grid expansion, smart metering, prosumers
5. Management of electricity supply and sales: key market segments, products and prices
6. Management of district heat generation and distribution: Technical aspects, real world example, Management of cogeneration plants, operation, maintenance and expansion of district heat grids

4 Competences
Students taking the course will

- be able to apply their knowledge of theory and methodology in exercises
- get familiar with modern concepts and methods for management in energy economics
- acquire an understanding of procedures for operational and strategic decision support in areas of electricity, district heating and renewable energy sectors
- deepen theory and methodology with case studies and numerical examples

5 Examination
Written exam (generally 60-90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Weber	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Empirie der internationalen Geld- und Finanzmärkte				**ME5**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Empirie der internationalen Geld- und Finanzmärkte	L	3	2 SWS
1b	Empirie der internationalen Geld- und Finanzmärkte	T	3	2 SWS

2 Language of instruction
English

3 Contents of the module
Die Veranstaltungen bieten neben einer detaillierten Analyse der grundlegenden Fragestellungen der monetären Ökonomik einen Überblick über die neueren theoretischen, politischen und empirischen Entwicklungen der wissenschaftlichen Forschung im Bereich von Geld und Währung. Im Hinblick auf die fortschreitende Globalisierung wird eine internationale Perspektive gewählt.

4 Competences
Die Studierenden

- verstehen die Inhalte der monetären Ökonomik auf dem aktuellen wissenschaftlichen Niveau
- sind in der Lage, die Methodik in eigenständigen empirischen Arbeiten, zum Beispiel im Rahmen einer Masterarbeit, anzuwenden
- sind durch die enge Verzahnung von Theorie und Praxis auf eine Vielzahl von Anforderungen der beruflichen Praxis vorbereitet
- sind durch die praktischen Übungen am PC auf eine Vielzahl von Anforderungen der beruflichen und wissenschaftlichen Praxis vorbereitet
- sind in der Lage, selbstständig wissenschaftliche Fragestellungen zu erörtern und zu lösen

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung, die sich auf folgende Prüfungsform erstreckt: Entweder Klausur (in der Regel: 60-90 Minuten) oder eine mündliche Prüfung (in der Regel 20-40 Minuten).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Volker Clausen	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Energy Markets and Price Formation				**ME5**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Energy Markets and Price Formation	L	3	2
1b	Energy Markets and Price Formation	T	3	2

2 Language of instruction

English

3 Contents of the module

1. Energy markets classified according to energy sources and customer segments
2. Products in energy trading: spot market, forwards, futures, options, real options
3. Pricing in wholesale markets I: Fundamental analytic models, problem formulations and solving as computer models
4. Pricing in wholesale markets II: Financial and econometric models, i.a. Wiener process, mean-reversion process, GARCH–model formulation and implementation
5. Organization of energy trading in companies: organizational structure, IT-Support
6. Valuating options: analytical methods (Black-Scholes, Black, Margrabe), numerical methods (Monte-Carlo-Simulation), tree-building methods
7. Risk management in energy trading: legal basis, risk management system, risk classification, risk measurement – Greeks, Value-at-Risk, Profit-at-Risk
8. Emissions trading: legal and economic foundation, design and trading strategies
9. Perspectives of energy trading and future methodological developments

4 Competences

Students taking the course will

- gain knowledge of products in energy trading
- learn modern concepts and methods of analyzing the pricing on energy markets
- learn how to describe and use procedures of fundamental and mathematical-econometric market analyses

5 Examinations

Written exam (generally 60-90 minutes) or oral exam (generally 20-40 minutes). The chosen examination method (written or oral exam) is defined during the first weeks of the lecture period.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, good knowledge in the field of investment and financing as well as general business administration is required. Knowledge of statistics and operations research would be an advantage.

8 Status of the Module

Elective module in M.Sc. Econometrics

9	**Module Coordinator** Prof. Dr. Christoph Weber	**Responsible Department** University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Entscheidungstheorie				**ME5**
M.Sc. Program: Econometrics				
Frequency Wintersemester	**Duration** 1 Semester	**Study section** 1.bis 3. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Entscheidungstheorie	V	3	2
1b	Entscheidungstheorie	Ü	3	2

2 Language of instruction
Deutsch

3 Contents of the module
Vermittlung von Kenntnissen in der Methodik der Entscheidungsfindung. Dabei wird zunächst auf Ein-Personen Entscheidungen unter Berücksichtigung von Informationsunvollkommenheit und Risiko eingegangen. Diese Analyse wird anschließend auf strategische Entscheidungen erweitert und auf aktuelle Beispiele angewandt. Es werden folgende Lehrinhalte abgedeckt: Einführung in die Entscheidungstheorie, Information und Entscheidung unter Unsicherheit, Theorie strategischer Entscheidung, Anwendungen Bayesianischer Spiele sowie Anreizstrukturen: Mechanism Design.

4 Competences
Die Studierenden
- sind in der Lage, die in aktuellen wissenschaftlichen Publikationen verwendete Methodik der Entscheidungsfindung und Interaktion kritisch nachzuvollziehen
- können die Methodik der Entscheidungstheorie und der Spieltheorie anhand einfacher Fragestellungen selbständig anwenden
- können die relevanten Aspekte identifizieren und diese nachvollziehbar darstellen
- sind in der Lage, die zugehörige Literatur zu identifizieren und selbständig kritisch die wesentlichen Aspekte verstehen und anwenden

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung in der Gestalt einer Klausur (in der Regel: 60-90 Minuten)

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Erwin Amann	University of Duisburg-Essen, Department of Business Administration and Economics

Module: International Capital Movements: Theory and Econometric Evidence				**ME5**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	International Capital Movements: Theory and Econometric Evidence	L	3	2
1b	International Capital Movements: Theory and Econometric Evidence	T	3	2

2 Language of instruction
English

3 Contents of the module
The course provides advanced knowledge of new theoretical and empirical research in the field of international capital movements. This includes the analysis of the determinants of international capital movements, the analysis of the determining reasons of exchange rate
movements as well as the analysis of the functionality of international financial markets. Furthermore, various explanatory approaches for international currency and financial crises are going to be presented and assessed.

4 Competences
Students
- understand the conceptual basics of international capital movements
- are able to present current models of international capital movements formally, graphically, and are also able to interpret them verbally
- are in a position to transfer the obtained knowledge and skills to other subjects

5 Examinations
The module-related examination is performed by a written test (usually 60-90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Volker Clausen	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Labour Economics and Public Policy					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Labour Economics and Public Policy	L	6	180 h

2 Language of instruction

English

3 Contents of the module

Labor markets are of great importance for the development of modern economies. Labor market policy measures are often at the center of political and public debate. This lecture provides an insight into labor market economics and the effects of labor market policy measures. The most important theoretical and empirical concepts of labor market economists are explained. In addition, recent empirical findings are discussed and linked to the current political debate.

4 Competences

The students

- learn the most important theoretical and empirical concepts of labor economics,
- know the current state of research in the field of labor economics,
- are able to analyze different aspects of labor market economic measures and to interpret and critically question scientific findings in this area.

5 Examinations

The module is examined in the form of a written exam (usually 60-90 minutes) or an oral exam (usually 20-40 minutes). The concrete form of the examination is determined by the lecturer after the first session.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Jun.-Prof. Dr. Sebastian Otten	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Migration Economics					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Migration Economics	L	6	180 h

2 Language of instruction

English

3 Contents of the module

Migration is one of the most important topics in the political and public debate. The lecture gives an insight into the economic aspects of migration. The most important theoretical and empirical concepts of migration research will be explained, and recent empirical findings will be discussed and linked to the current debate on migration.

4 Competences

The students

- learn the most important theoretical and empirical concepts of migration economics,
- know the current state of research in the field of migration economics,
- are able to analyze various aspects of immigration and integration from an economic perspective and to interpret and critically question scientific findings in this area.

5 Examinations

The module is examined in the form of a written exam (usually 60-90 minutes) or an oral exam (usually 20-40 minutes). The concrete form of the examination is determined by the lecturer after the first session.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, advanced knowledge in microeconomics and microeconometrics is strongly recommended.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Jun.-Prof. Dr. Sebastian Otten	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Neuere Entwicklungen der Mikroökonomik					**ME5**
M.Sc. Program: Econometrics					
Frequency Jedes Semester	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Neuere Entwicklungen der Mikroökonomik	Kolloquium	6	2

2 Language of instruction
Deutsch/English

3 Contents of the module
Analyse aktueller wissenschaftlicher Texte aus dem Bereich Mikroökonomik. Lehrinhalte sind Bayesian Games, Mechanism Design, Implementation Theory sowie Informationally Decentralized Systems.

4 Competences
Die Studierenden
- können aktuelle wissenschaftliche Texte aus dem Bereich der mikroökonomischen Theorie insbesondere der Spieltheorie lesen, hinterfragen und die zentralen Erkenntnisse nachvollziehbar präsentieren
- sind in der Lage, diese Erkenntnisse und Methoden auf neue selbst identifizierte Fragestellungen eigenständig zu übertragen

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung, die sich auf folgende Prüfungsformen erstreckt: vorlesungsbegleitendes Erstellen von drei wissenschaftlichen Essays (Umfang in der Regel je 2 bis 3 Seiten) zu den jeweiligen Themen, Präsentation und Diskussion.

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator
Prof. Dr. Erwin Amann

Responsible Department
University of Duisburg-Essen (Essen), Department of Business Administration and Economics

<table>
<tr><td colspan="5">Module: Selected Topics in Empirical Capital Market Research</td><td>ME5</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
6</td><td>Time
180 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Selected Topics in Empirical Capital Market Research</td><td>S</td><td>6</td><td>180 h</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
Selected topics in empirical capital market research. The module provides students with the knowledge and skills to independently and critically analyze a practically and scientifically relevant subfield of empirical capital market research based on an in-depth literature review as well as an accompanying presentation</td></tr>
<tr><td>4</td><td colspan="5">Competences
The students
meet the formalities of a scientific paper
independently collect, systemize, compare, and review the state-of-the-art academic literature
acquire a profound understanding of a specific subfield of empirical capital market research
can evaluate scientific studies accurately, understand the methodology used in leading papers of the field, can interpret estimation results correctly
are able to critically reflect on limitations of existing research
are in a position to identify starting points for their own research</td></tr>
<tr><td>5</td><td colspan="5">Examinations
The module is examined in a module-related examination which covers the following forms of examination: Writing a seminar paper (15 pages, 75% of the grade) and presentation and discussion of the paper in a plenary session (20 minutes, 25% of the grade). Both parts must be passed to pass the seminar.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
- none -</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. Heiko Jacobs</td><td colspan="3">Responsible Department
University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen</td></tr>
</table>

Module: Seminar Health and Development					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Fachseminar Health and Development	S	6	180 h

2 Language of instruction

English

3 Contents of the module

The seminar covers the following topics, among others:

- Education and schooling experiments
- Environmental/Infrastructural Determinants of Health
- Income and microfinance
- Information and changes in health behavior
- Early childhood interventions
- Impact of Health on Individual Productivity
- Demand for Health Products and Healthcare
- Supply of Health Care

The concrete topics will be announced in the first session.

4 Competences

The students

- are able to write their own scientific work in the field of health economics in the context of developing countries
- are able to discuss and solve their own as well as external questions in plenary sessions

5 Examinations

The module is examined in a module-related examination which covers the following forms of examination: Writing a seminar paper (15 pages, 70% of the grade) and presentation and discussion of the paper in a plenary session (30 minutes, 30% of the grade). Both parts must be passed to pass the seminar.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator

Jun.-Prof. Dr. Daniel Kühnle

Responsible Department

University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Seminar Labour Economics and Public Policy					**ME5**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Fachseminar Labour Economics and Public Policy	S	6	180 h

2 Language of instruction
German or English

3 Contents of the module
In this seminar, students work on a current issue from the field of labour market economics and write a seminar paper in which the topic is presented and classified in the literature, the methodological approach is explained and conclusions are critically evaluated. The seminar papers are presented and discussed in a block seminar.

4 Competences
The students
- know the current state of research in the field of the respective topic
- can understand and critically evaluate scientific studies
- deepen their knowledge in independent scientific work,
- are prepared for the requirements of a master thesis,
- improve their presentation and communication skills,
- are able to discuss and solve their own as well as external questions in plenary sessions.

5 Examinations
A module-related examination takes place for the module, which covers the following forms of examination: seminar paper (usually: 15 pages, 70% of the grade) and presentation and discussion of the paper in plenary (usually: 30 minutes, 30% of the grade). To pass the seminar both parts must be passed.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Jun.-Prof. Dr. Sebastian Otten	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Seminar Soziale Sicherung und Besteuerung: Empirische Studien und eigene Projekte				**ME5**
M.Sc. Program: Econometrics				
Frequency Wintersemester	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Fachseminar Soziale Sicherung und Besteuerung: Empirische Studien und eigene Projekte	S	6	4

2 Language of instruction

Deutsch

3 Contents of the module

Das Abfassen der Projekt- oder Seminararbeit steht im Zentrum dieser Veranstaltung. Die Teilnehmer sind dazu aufgefordert, eigene Forschungsthemen zu entwickeln und diese dann in Kooperation mit dem Dozenten zu konkretisieren. Dabei umfasst das Spektrum möglicher Forschungsgegenstände den gesamten Bereich der sozialen Sicherung (z.B. Renten- und Gesundheitspolitik) und darüber hinaus weitere Themen wie zum Beispiel die Bildungspolitik. Während der Bearbeitungsphase durchlaufen die Studierenden sämtliche Phasen der empirischen Arbeit (Literaturrecherche und –auswertung, Datenaufbereitung und Schätzung sowie Dokumentation der Forschungsergebnisse) und werden dabei durch den Dozenten betreut. Durch die Präsentationen der eigenen Forschungsarbeiten erhalten die Teilnehmer auch einen Einblick in die Studien der jeweils anderen Studierenden. Falls notwendig werden ergänzende Methodenvorlesungen mit variablen Themen gelesen.

4 Competences

Die Studierenden

- können sich kritisch mit empirischen Studien aus dem Bereich der sozialen Sicherung und Besteuerung auseinandersetzen und diese bewerten
- können sich auf der Grundlage von bereits vorhandenen empirischen Studien das methodische Vorgehen erarbeiten und dieses in eigene Projektvorschläge umsetzen
- können Mikrodatensätze für empirische Analysen mit Stata aufbereiten
- können ökonometrische Methoden mit Stata eigenständig anwenden
- können kritische Aspekte von empirischen Studien identifizieren und hieraus Verbesserungsvorschläge oder eigene Forschungsvorhaben entwickeln

5 Examinations

Zum Modul erfolgt eine modulbezogene Prüfung, die sich auf folgende Prüfungsformen erstreckt: Hausarbeit (20-30 Seiten) und Präsentation (in der Regel: 10 Minuten). Benotung: 50% schriftliche Hausarbeit, 40% Präsentation der Arbeit, 10% Diskussion im Plenum.

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements

- keine -

8 Status of the Module

Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Kristina Strohmaier	University of Duisburg-Essen, Department of Business Administration and Economics

Module: Stock Market Anomalies and Quantitative Trading Strategies					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Stock Market Anomalies and Quantitative Trading Strategies	L + S	6	4

2 Language of instruction

English

3 Contents of the module

The lecture gives an introduction to the field of equity market anomalies. It provides an overview over well-known as well as and recently discovered cross-sectional quantitative anomalies and discusses from both a theoretical and an empirical point of view why these return patterns might arise and persist. It also discusses to which extent these anomalies may be translated into effective investment strategies and explains potential pitfalls when evaluating trading strategies.
In the second half of the semester, students make use of their newly acquired knowledge by writing and presenting a seminar paper in which they critically evaluate specific trading strategies/market anomalies. Students can decide whether their paper is based mainly on a synthesis of the literature or based mainly on programming, backtesting, and critically discussing a self-proposed trading strategy (for instance via the online platform "Quantopian").

4 Competences

Students

- have a profound understanding of the most important stock market anomalies
- are able to critically reflect to what extent the anomalies can be translated into real-life trading strategies
- know the key insights of theoretical, experimental, and empirical research aiming at explaining the anomalies
- have a profound understanding of the link between individual behavior in financial markets, market frictions, and resulting return patterns
- can evaluate scientific studies accurately, understand the methodology used in leading papers of the field, can interpret estimation results correctly, and analyze them critically
- can identify starting points for their own research and to present and defend their research proposals in a professional way

5 Examinations

seminar paper (usually 15 pages, 65% of the grade), an accompanying presentation (usually 15 minutes, 25% of the grade), active participation in the discussions of other presentations (10%).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Heiko Jacobs	

		University of Duisburg-Essen, Faculty of Business Administration and Economics

Module: Advanced R for Econometricians				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Advanced R for Econometricians	L + T	6	4

2 Language of instruction

English

3 Contents of the module

The first part of the course covers intermediate concepts in functional and object orientated programming, error handling, profiling and benchmarking as well as a treatment of selected R packages tailored for big data applications. Students are also introduced to reporting with dynamic documents. Part II deals with the tidyverse, a collection of packages designed for modern applications in data science. The third part introduces topics such as multi-core computing, C++ integration and other cutting-edge R extensions.

4 Competences

Students

- are prepared for applications in future studies and are able to efficiently tackle research-related programming tasks.
- know the strengths and limitations of the high-level statistical programming language R.
- thoroughly understand the R ecosystem and have a profound understanding in selected fields of advanced R programming.
- can apply their skills in advanced statistical and econometric applications
- are able to document and communicate scientific results in a reproducible manner.

5 Examinations

Weighted average of a (group) R-project (70%) and a presentation (30%, usually about 20 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Hanck	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Structuring and Valuation					**ME5**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Structuring and Valuation	L + T	6	4

2 Language of instruction
English

3 Contents of the module
The course covers the following topics, among others:

- Spot and forward price modeling in energy markets
- Valuation of Derivatives
- Risk positions and risk measures
- Modeling volatility and correlation in cross-commodity positions
- Analysis and discussion of emission markets

The concrete topics will be announced in the first session.

4 Competences
Students

- analyze current problems in the field of energy trading.
- understand complex quantitative techniques and apply them to analyze the structures of financial contracts and physical assets frequently used in energy markets.
- are able to evaluate the risk attended by such contracts and to explain it to non-experts.
- are able to critically discuss and interpret model results as well as to extend models
- are able to implement the introduced models in a common programming language (e.g. Python)

5 Examinations
Written exam (generally 60-90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Rüdiger Kiesel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Applied Labour Economics				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Applied Labour Economics	L	6	180 h

2 Language of instruction

English

3 Contents of the module

Using given data sets, econometric methods of analysis are applied to current issues in labor market economics and independently empirically investigated. A detailed outline will be provided in the first lecture. Selected topics include:

- Gender wage gap
- Returns to education
- Labour supply of married women
- Effects of a job training program
- Unemployment benefits and job quality
- Welfare effects of unemployment benefits

4 Competences

The student

- learn to competently interpret, evaluate and question labor market studies
- understand to apply quantitative methods in a differentiated way, to form hypotheses and to test them empirically.
- will be able to develop research designs, conduct econometric analyses and process the results of these analyses by working independently on a PC.
- also know how to present the findings of other people's or their own empirical work concisely, evaluate them critically and communicate them to the (specialist) public.

5 Examinations

The module is examined in the form of a term paper (usually: 15 pages) or a term paper (usually: 15 pages, 70% of the grade) and a presentation (usually: 30 minutes, 30% of the grade). The concrete form of the examination is determined by the lecturer after the first session.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None. However, basic knowledge in microeconomics and microeconometrics is strongly recommended.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Jun.-Prof. Dr. Daniel Kühnle	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Deep Learning in Energy					**ME6**
M.Sc. Program: Econometrics					
Frequency As offered	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Deep Learning in Energy	L + T	6	2

2 Language of instruction
English

3 Contents of the module
The objective of the lecture is to provide a basic understanding of energy markets and systems such as deep learning based modeling methods with a focus on feed forward neural network and recurrent neural networks. The aim of this course is to understand and apply deep learning algorithms to real data using the pytorch library, to interpret and to visualize the results.

4 Competences
The students
- have an advanced understanding of electricity markets and systems
- understand deep learning based modeling methods for energy markets and systems
- can apply estimation and forecasting algorithms to real data using deep learning software
- are able to interpret and to visualize the results

5 Examinations
Equally weighted average of a group project and a presentation (usually about 20 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Florian Ziel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Econometrics of Electricity Markets					**ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester		**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1a	Econometrics of Electricity Markets	L	3	2
	1b	Econometrics of Electricity Markets	T	3	2
2	**Language of instruction** English				
3	**Contents of the module** The objective of the lecture is to provide a basic understanding of electricity markets and regression based modeling methods for electricity prices. The aim of this course is to apply estimation and forecasting algorithms to real data using the statistical Software R, to interpret and to visualize the results. The lecture covers the following subjects: introduction to electricity markets, an overview of different model approaches, regression based modeling methods for electricity prices, forecasting and evaluation techniques and advanced estimation and modeling approaches. In the tutorials, the students apply the learned methods in an own real data project.				
4	**Competences** The students - have an advanced understanding of electricity markets • understand regression based modeling methods for electricity prices - can apply estimation and forecasting algorithms to real data using the statistical Software R - are able to interpret and to visualize the results				
5	**Examinations** Equally weighted average of a group R-project and a presentation (usually about 20 minutes).				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none -				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Florian Ziel		**Responsible Department** University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen		

Module: Empirische Bilanzanalyse					**ME6**
M.Sc. Program: Econometrics					
Frequency Unregelmäßig zum Sommersemester (im Wechsel mit „Stichprobentheorie“)		**Duration** 1 Semester	**Study section** 2. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Empirische Bilanzanalyse	V	3	2
1b	Empirische Bilanzanalyse	Ü	3	2

2 Language of instruction
Deutsch

3 Contents of the module
Im Rahmen der Veranstaltung werden für das empirische Arbeiten mit umfangreichen Unternehmensbilanzdatensätzen besonders relevante statistische Methoden behandelt. Ausgewählte Fragen (Möglichkeiten der Insolvenzprognose, Determinanten der Investitionstätigkeit, Ausmaß der Finanzialisierung, etc.) werden unter Verwendung der dargestellten Methoden empirisch untersucht. Zu diesen Methoden gehören Regressionsansätze wie statische und dynamische Panelmodelle und Logit-/Probit-Regression, Entscheidungsbäume und Zufallswälder. Es erfolgt eine Anwendung der Methoden auf Unternehmensbilanzdaten zur vertieften Diskussion ökonomischer Fragestellungen.

4 Competences
Die Studierenden
- kennen ausgewählte empirische Methoden
- beherrschen den Umgang mit Unternehmensbilanzdaten
- entwickeln eigenständig Strategien, um inhaltliche Fragen empirisch zu untersuchen
- wenden ausgewählte empirische Methoden mit geeigneter Software eigenständig auf Unternehmensbilanzdaten an

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung in der Gestalt einer empirischen Auswertung am PC (Prüfung vor Ort, in der Regel: 90-120 Minuten).

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Andreas Behr	University of Duisburg-Essen (Essen),

<table>
<tr><td colspan="5">Module: Empirical Finance</td><td>ME6</td></tr>
<tr><td colspan="6">M.Sc. Program: Econometrics</td></tr>
<tr><td colspan="2">Frequency
Winter semester</td><td>Duration
1 semester</td><td>Study section
1st to 3rd semester</td><td>Credit Points
5</td><td>Time
150 h</td></tr>
<tr><td>1</td><td colspan="5">Structure of the module
<table>
<tr><th>No.</th><th>Courses</th><th>Type</th><th>Credit Points</th><th>Credit Hours</th></tr>
<tr><td></td><td>Empirical Finance</td><td>L</td><td>5</td><td>2</td></tr>
</table></td></tr>
<tr><td>2</td><td colspan="5">Language of instruction
English or German</td></tr>
<tr><td>3</td><td colspan="5">Contents of the module
This course contains the theoretical background of current financial issues, the application of econometric methods to finance-related research questions, as well as the discussion of current empirical publications dealing with finance-related topics based on an inverted classroom approach.</td></tr>
<tr><td>4</td><td colspan="5">Competences
The objectives of the course are to strengthen skills in basic and advanced econometric methods and the application of econometric methods to concrete research questions in finance, the ability to discuss current topics in the field of finance, the preparation of students for empirical master theses, and the critical discussion of empirical research papers.</td></tr>
<tr><td>5</td><td colspan="5">Examinations
Written or oral exam. The mode of the exam will be assigned at the beginning of the course.</td></tr>
<tr><td>6</td><td colspan="5">Type of Examinations
<table>
<tr><td>covering the entire module</td><td>Relating to individual courses</td></tr>
</table></td></tr>
<tr><td>7</td><td colspan="5">Requirements
None. However, knowledge of statistical and econometric methods is strongly recommended.</td></tr>
<tr><td>8</td><td colspan="5">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td colspan="2">Module Coordinator
Prof. Dr. Martin Hibbeln</td><td colspan="3">Responsible Department
University of Duisburg-Essen, Mercator School of Management, Campus Duisburg</td></tr>
</table>

Module: Empirische Methoden				**ME6**
M.Sc. Program: Econometrics				
Frequency Wintersemester	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Vorlesung: Empirische Methoden	V	3	2
1b	Übung: Empirische Methoden	Ü	3	2

2 Language of instruction
Deutsch

3 Contents of the module
Im Rahmen der Vorlesung werden für das empirische Arbeiten mit umfangreichen Datensätzen besonders relevante statistische Methoden behandelt. Hierbei stehen Methoden für den Umgang mit Paneldaten und Methoden zur Abschätzung von Treatment Effekten im Vordergrund, insbesondere Verfahren zur Analyse von Verweildauerdaten und Methoden der statistischen Kausalanalyse.
Die Übung befasst sich mit Anwendungen dieser Methoden mit Hilfe der statistischen Software R.

4 Competences
Die Studierenden
- kennen ausgewählte empirische Methoden
- beherrschen den Umgang mit Daten, die Grundlage empirischer Analysen sind
- wenden ausgewählte empirische Methoden mit geeigneter Software eigenständig an

5 Examinations
Zum Modul erfolgte eine modulbezogene Prüfung in Form einer Präsentation (i.d.R. 10 - 20 Minuten, 50 % der Note) und einer Hausarbeit (10 - 20 Seiten, 50 % der Note) zu einer eigenständigen empirischen Analyse.

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Andreas Behr	University of Duisburg-Essen (Essen), Department of Business Administration and Economics

Module: Financial Mathematics				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Financial Mathematics	L	3	2
1b	Financial Mathematics	T	3	2

2 Language of instruction
English

3 Contents of the module
Discussion of essential mathematical valuation principles and techniques both in time-discrete and time-continuous models. Introduction and implementation of probabilistic and statistical methods. Analysis of stock, interest and commodity markets and also of the most common assets and derivatives in these markets. This includes mathematical models for price processes in stock, interest, and commodity markets, arbitrage theory and hedging strategies, stochastic models for financial markets: martingales and fundamental theorems in asset pricing, valuation and hedging of derivatives: European, American and exotic options, as well as incomplete markets and stochastic volatility.

4 Competences
Students
- know the most important mathematical modelling techniques of financial markets and can apply them to real word problems
- are able to value simple derivative assets and can apply the main principles of risk management
- are able to solve basic risk management tasks arising in financial institutions and the energy industry

5 Examinations
Written exam (generally 90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Rüdiger Kiesel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Financial Risk Management				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Financial Risk Management	L	3	2
1b	Financial Risk Management	T	3	2

2 Language of instruction
English

3 Contents of the module
Regulation: Basel II/III, Solvency II
Risk Categories
Risk Measurements
Valuation of Options, "Greeks"
Hedging Strategies

4 Competences
At the end of this course, Students will be able to demonstrate that they can

- understand the core principles of quantitative risk management.
- understand mathematical and statistical techniques used in risk management.
- use Monte-Carlo methods for risk measure calculations.
- apply the theoretical principles discussed in class to real-world problems.
- apply the knowledge gained to current problems in academic research.
- discuss issues in the field of risk and bank management both in German and English.
- communicate and debate topics of the lecture in a structured and professional way.

5 Examinations
Written exam (generally 60–90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Rüdiger Kiesel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Inequality in Health					**ME6**
M.Sc. Program: Econometrics					
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Inequality in Health	L + T	6	4

2 Language of instruction

English

3 Contents of the module

The students gain a sound knowledge of the theory and empirical contributions in the area of inequality in health. Topics discussed include, measurement, decomposition and quantitative analysis of inequality, the relationship between poverty and health / income inequality and health and the emergence of a social gradient in health as well as distributive justice and health.

4 Competences

Students taking this course will

- get familiar with quantitative measurement and decomposition methods for health and income inequality
- learn how health is related to socioeconomic status, poverty, economic development, demographic transition, income inequality and equity
- deepen their theoretical and empirical knowledge of health economics
- acquire a broad understanding of the importance of health-related factors for economy and society

5 Examinations

Final written exam on the teaching materials covered in lectures and tutorials (usually 60-90 min.).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Martin Karlsson	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Mikroökonometrie					**ME6**
M.Sc. Program: Econometrics					
Frequency Sommersemester	**Duration** 1 Semester	**Study section** 2. Semester	**Credit Points** 6	**Time** 180h	

1	**Structure of the module**				
	No.	**Courses**	**Typ**	**Credit Points**	**Credit Hours**
	1a	Mikroökonometrie	V	3	2
	1b	Mikroökonometrie	Ü	3	2
2	**Language of instruction** Englisch				
3	**Contents of the module** Einführung in nichtlineare mikroökonometrische Modelle und Schätzverfahren. Insbesondere werden behandelt: - Fragestellungen der empirischen Analyse - Datengrundlagen und Auswertungsmethoden - Deskriptive und kausale Analyse - Das Paradigma der experimentellen Analyse und die Probleme nicht-experimenteller Daten in den Sozialwissenschaften - Das Problem der Kausalanalyse am Beispiel der Evaluation wirtschafts- und sozialpolitischer Maßnahmen - Regressionsmodelle als Spezialfälle statistischer Modelle - Spezielle mikroökonometrische Verfahren und Modelle (lineare Panelmodelle, Modelle für diskrete abhängige Variablen, Zensierung, Matching, Duration Analysis)				
4	**Competences** Die Studierenden - können formale Darstellungen empirischer Modelle nachvollziehen und erklären - können aufbauend auf den vorhandenen Kenntnissen aktuelle Entwicklungen der ökonometrischen Methoden nachvollziehen - können sich die empirische Literatur auf Grundlage der erlernten Methoden selbständig erarbeiten und diese bewerten - können mikroökonometrische Methoden dem gestellten Problem adäquat einsetzen - können grundlegende Auswertungen und Analysen mittels STATA durchführen				
5	**Examinations** Klausur (in der Regel: 60-90 Minuten).				
6	**Type of Examinations**				
	Modulprüfung		Teilleistungen		
7	**Requirements** - keine -				
8	**Status of the Module** Wahlmodul im M.Sc. Econometrics				
9	**Module Coordinator** Jun.-Prof. Dr. Daniel Kühnle		**Responsible Department** University of Duisburg-Essen (Essen), Department of Business Administration and Economics		

Module: Portfolio Management					**ME6**
M.Sc. Program: Econometrics					
Frequency Every Summer semester		**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Portfolio Management	L	3	2
1b	Portfolio Management	T	3	2

2 Language of instruction
English

3 Contents of the module
The students study the general Markowitz portfolio theory on optimal portfolio selection with and without risk-free asset. They study problems in the application concerning estimation risk, like the Jobson-Korkie experiment and possible solutions. The theory is applied to problem in financial and commodity markets.

4 Competences
Students
- have an advanced understanding in portfolio management
- study modern portfolio optimization methods that take uncertainty into account
- are able to apply the portfolio theory to real problems, especially in financial and commodity markets

5 Examinations
Final written exam on the teaching materials covered in lectures and tutorials (usually 90-120 min.).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Florian Ziel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Practising Econometric Research				**ME6**
M.Sc. Program: Econometrics				
Frequency Winter semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
	Seminar: Practising Econometric Research	L	6	180 h

2 Language of instruction

English

3 Contents of the module

Participants gain insight into recent econometric research and are familiarized at an early stage with how professional researchers present by attending several research seminar presentations. Students prepare themselves for the presentations by reading suitable seminal papers and/or working paper versions on which the presentation is based beforehand. Summaries of the seminars and a small final project relating to a selected presentation must be prepared.

Students may choose from a list of seminars at all campuses of TUD, UDE and RUB. These will mostly be an appropriate subset with statistical/econometric focus of the seminars linked at the bottom of http://rgs-econ.org/courses/.

4 Competences

The students

- gain insight into recent developments of econometric research in selected fields
- are trained in following scientific talks and are able to critically evaluate these
- are able to apply specialist and methodological knowledge obtained during their studies and from scientific talks to a particular research topic
- manage to work self-sufficiently at a scientific level under time constraints and thus are also prepared for writing seminar papers and a master thesis

5 Examinations

Students attend at least 7 presentations in economic research seminars hosted at TU Dortmund University, Ruhr University Bochum and University of Duisburg-Essen. Attendance needs to be signed by a present member of the faculty of the MSc Econometrics, or else some other faculty member of the contributing faculties. Admissible seminars will be announced at the introductory meeting. Students also may put forward their own suggestions.

A 1-2 page report must be written on each presentation. The summaries should evaluate the talk, i.e. briefly summarise the topic, explain the scientific contribution and reflect whether or not the talk was comprehensible and useful for the student. The report is due one week after the presentation.

Based on one of the talks, students will perform a small research project on their own. This might consist of coding and simulating a new statistical technique put forward in the presentation, replicating part of the empirical work, providing detailed proofs of a theoretical result, compiling a detailed literature review etc. The length of the research report is up to six pages.

The assessment of the course will be based (50% each) on the summaries and the research project. Based on the project, students give a presentation. The grade for the project is based 4:1 on the research report.

<table>
<tr><td>6</td><td colspan="2">Type of Examinations<table><tr><td>covering the entire module</td><td>Relating to individual courses</td></tr></table></td></tr>
<tr><td>7</td><td colspan="2">Requirements
- none -</td></tr>
<tr><td>8</td><td colspan="2">Status of the Module
Elective module in M.Sc. Econometrics</td></tr>
<tr><td>9</td><td>Module Coordinator
Prof. Dr. Christoph Hanck</td><td>Responsible Department
University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen</td></tr>
</table>

Module: Quantitative Modelle internationaler Wirtschaftsbeziehungen				**ME6**
M.Sc. Program: Econometrics				
Frequency Wintersemester	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Quantitative Modelle internationaler Wirtschaftsbeziehungen	V	3	2
1b	Quantitative Modelle internationaler Wirtschaftsbeziehungen	Ü	3	2

2 Language of instruction
Deutsch

3 Contents of the module
Die Veranstaltung vermittelt vertiefte Kenntnisse über die neuere theoretische und empirische Forschung im Bereich der quantitativen Analyse internationaler Wirtschaftsbeziehungen. Dazu gehören die Analyse der Auswirkungen der Globalisierung auf das Wirtschaftswachstum von Volkswirtschaften, die Analyse der Determinanten internationaler Konjunkturübertragung, der Bestimmungsgründe der Reaktion der Handelsbilanz auf Wechselkursänderungen sowie die Untersuchung der Determinanten ausländischer Direktinvestitionen und der Organisation multinationaler Unternehmen.

4 Competences
Die Studierenden
- beherrschen den aktuellen Stand der Forschung im Bereich der Theorie und Empirie der realen Außenwirtschaft und der internationalen Wirtschaftsbeziehungen
- sind in der Lage, die Methoden der angewandten Wirtschaftsforschung selbständig anzuwenden
- können Fragestellungen aus dem Bereich der internationalen Wirtschaftsbeziehungen theoretisch analysieren und praktisch überprüfen
- sind in der Lage die relevanten Theorien herzuleiten und zu vergleichen
- hinterfragen aktuelle empirische Studien kritisch

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung in der Gestalt einer Klausur (in der Regel: 60-90 Minuten).

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Volker Clausen	University of Duisburg-Essen (Essen), Department of Business Administration and Economics

Module: Quantitative Climate Finance					**ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 2. semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Quantitative Climate Finance	L	3	2
1b	Quantitative Climate Finance	T	3	2

2 Language of instruction
English

3 Contents of the module
Discussion and analysis of financial instruments in the context of economics of climate change. Introduction to emission trading scheme and valuation methods for emission certificates and financial contracts based on emission certificates.

4 Competences
The students
- will investigate current issues in the field of economics of climate change with a focus on quantitative modelling
- understand stochastic valuation methods for financial contracts related to climate issues and learn how to apply them
- question the models critically, interpret model results and extend them

5 Examinations
Written exam (usually 90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
- none -

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Rüdiger Kiesel	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Selected Topics in Risk Management					**ME6**
M.Sc. Program: Econometrics					
Frequency Summer semester	**Duration** 1 semester	**Study section** 2. semester	**Credit Points** 6	**Time** 180h	

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Selected Topics in Risk Management	S	6	2
2	**Language of instruction** English				
3	**Contents of the module** Students independently solve specific problems in the area of risk management. They discuss and present main aspects of scientific papers on these topics.				
4	**Competences** The students are able to independently acquire specific knowledge in the area of risk management and are able to apply these knowledge to solve real word problems. Further, students are able to write a scientific paper.				
5	**Examinations** Scientific paper (20-40 pages; 70% of the grade), presentation (about 25 minutes; 30% of the grade)				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none -				
8	**Status of the Module** Elective module in M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Rüdiger Kiesel		**Responsible Department** University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen		

Module: Applied Panel Time Seires Analysis in International Economics				**ME7**
M.Sc. Program: Econometrics				
Frequency irregularly	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Applied Panel Time Seires Analysis in International Economics	L + S	6	4

2 Language of instruction

English

3 Contents of the module

In this module, the students apply methods of panel time series analysis (e.g. for unit root testing, cointegration analysis, and structural identification for vector auto-regressive models) to empirical topics in international economics, such as purchasing power parity, exchange rate impacts on import prices, and monetary policy transmission in a monetary union.

4 Competences

Students

- can identify empirical problems in the literature of international economics and narrow those down to specific research questions
- can apply adequate econometric methods to answer these questions
- can present, interpret, and discuss their results in the context of the literature
- can discuss and collaboratively solve their own and other students' subject-specific issues in plenary sessions
- are prepared for the requirements of an empirical Master's thesis

5 Examination

consisting of a graded written paper (65 % of the grading)
and an oral presentation (35 % of the grading).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Volker Clausen	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Bayesian Econometrics				**ME7**
M.Sc. Program: Econometrics				
Frequency irregularly	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Bayesian Econometrics	L	3	2 SWS
1b	Bayesian Econometrics	T	3	2 SWS

2 Language of instruction
English

3 Contents of the module
Bayesian inference, classical simulation methods, Markov chains, Markov chain Monte-Carlo methods, Gibbs-sampling, Metropolis-Hastings algorithm. Applications, such as linear regression, Lasso, (multivariate) time series and latent variable models.

4 Competences
Students

- acquire comprehensive knowledge of modern statistical and econometric tools
- are capable of applying these to tackle empirical issues in economics and beyond and find and prepare appropriate data to do so and
- know how to translate an empirical question into an econometric model and critically assess empirical findings
- are proficient in assessing the formal properties of key methods and are able to derive these formally
- independently and competently use and develop statistical software and code to put empirical work into practice
- independently solve selected problem sets

5 Examination
Examination for this module takes place through a written exam (typically 60-90 minutes), an oral exam or an empirical project (70% of the final grade) combined with a presentation (typically 20 minutes, 30% of the final grade). The type of examination will be communicated at the start of the semester.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Hanck	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Causality and Programme Evaluation				**ME7**
M.Sc. Program: Econometrics				
Frequency Summer semester	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Causality and Programme Evaluation	L + T	6	4

2 Language of instruction

English

3 Contents of the module

This is a Master/Ph.D.-level course in causal inference and program evaluation methodology. We will focus on using the potential outcomes approach as a general organizing principle and examine identification and estimation of treatment effects under various types of assumptions. The course will not go into great depth in regard to any particular applied econometric method but will instead aim to provide you with enough knowledge about each one to know when, and when not, to use it in empirical work.

Course outline:

- Theories of Causation Conducting Experiments in Economics
- Randomisation
- Differences-in-Differences
- Instrumental Variables
- Fuzzy DiD / Multiple Testing
- Regression Discontinuity Design
- Methods based on Unconfoundedness
- Quantile Regression
- Evaluating Evaluation Techniques

4 Competences

Students taking the course will

- Acquire a sound understanding of identification strategies in microeconometrics
- Gain knowledge of the advantages and limitations of experimental research
- Get familiar with the most important non-experimental techniques and their underlying assumptions
- Learn how to critically assess empirical microeconometric work

5 Examinations

In order to pass the course students need to solve and hand in problem sets (20% of the final grade), and to write a term paper (usually 20-30 pages, 80% of the final grade) in which they pursue an own empirical evaluation.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Martin Karlsson	

		University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Multivariate Time Series Analysis					**ME7**
M.Sc. Program: Econometrics					
Frequency irregular	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Multivariate Time Series Analysis	L	3	2 SWS
1b	Multivariate Time Series Analysis	T	3	2 SWS

2 Language of instruction
Deutsch/English

3 Contents of the module
Vermittlung der Theorie stationärer und nicht-stationärer Vektor-Autoregressiver (VAR) Modelle und ihrer praktischen Implementierung. Diskutiert werden stationäre VAR Modelle, Prognosen, Kointegration, Fehlerkorrekturmodelle sowie Parameterschätzung.

4 Competences
Die Studierenden
- besitzen einen umfassenden Überblick über stationäre und nicht-stationäre Vektor-Autoregressive (VAR) Modelle
- kennen die statistischen Eigenschaften der wichtigsten Schätzer
- können ökonomische Zusammenhänge in VAR Modelle überführen, geeignete Daten auswählen und empirische Befunde kritisch kommentieren
- sind in der Lage eigenständig und mit Hilfe statistischer Software empirische Analysen durchzuführen
- können selbständig ausgewählte Übungsaufgaben bearbeiten

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung in der Gestalt einer Klausur (in der Regel: 60-90 Minuten).

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator
Prof. Dr. Christoph Hanck

Responsible Department
University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Nonparametric Econometrics					**ME7**
M.Sc. Program: Econometrics					
Frequency irregularly		**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Nonparametric Econometrics	L	3	2 SWS
1b	Nonparametric Econometrics	T	3	2 SWS

2 Language of instruction
English

3 Contents of the module
Univariate density estimation, multivariate density estimation, inference about the density, nonparametric regression, smoothing discrete variables, regression with discrete covariates, semiparametric methods, and instrumental variables.

4 Competences
Students

- acquire comprehensive knowledge of modern statistical and econometric tools
- are capable of applying these to tackle empirical issues in economics and beyond and find and prepare appropriate data to do so and
- know how to translate an empirical question into an econometric model and critically assess empirical findings
- are proficient in assessing the formal properties of key methods and are able to derive these formally
- independently and competently use and develop statistical software and code to put empirical work into practice
- independently solve selected problem sets

5 Examination
Examination for this module takes place through a written exam (typically 60-90 minutes), an oral exam or an empirical project (70% of the final grade) combined with a presentation (typically 20 minutes, 30% of the final grade). The type of examination will be communicated at the start of the semester.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Hanck	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Financial Econometrics					**ME7**
M.Sc. Program: Econometrics					
Frequency Irregularly		**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Financial Econometrics	L + T	6	2 SWS

2 Language of instruction
English

3 Contents of the module
Stochastic discount factor, Nonlinear generalized method of moments (GMM), Factor pricing models, Equity premium puzzle, Predictability of returns, Multivariate volatility modeling

4 Competences
Students

- acquire comprehensive knowledge of financial econometric methods for both cross-sectional data as well as time series data and are proficient in their application
- are able to transfer questions concerning financial market data into suitable models, to estimate the models with the help of current methods, to draw valid conclusions from the data and to question the empirical results
- can competently evaluate and critically examine studies in financial econometrics
- are able to solve practical problems independently with the help of statistical software

5 Examination
Written exam (usually 60 - 90 minutes).

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Yannick Hoga	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Seminar Ökonometrische Methoden					**ME7**
M.Sc. Program: Econometrics					
Frequency unregelmäßig		**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Fachseminar Ökonometrische Methoden	S	6	2

2 Language of instruction

Deutsch/Englisch

3 Contents of the module

Im Rahmen des Fachseminars Ökonometrische Methoden erarbeiten, präsentieren und diskutieren die Studierenden aktuelle Forschungsergebnisse aus der methodischen sowie unter Umständen angewandten Ökonometrie.

4 Competences

Die Studierenden

- wenden in den Vorlesungen behandelte Theorien und ökonometrische Methoden auf eine konkrete empirische Fragestellung an
- führen eigenständig eine ökonometrische Analyse auf aktuellem wissenschaftlichem Niveau durch
- interpretieren ihre Ergebnisse und vergleichen diese mit relevanten Ergebnissen aus der wissenschaftlichen Literatur
- ziehen Schlussfolgerungen bzgl. der Theorie und geben Politikempfehlungen

5 Examinations

Zum Modul erfolgt eine modulbezogene Prüfung, die sich auf folgende Prüfungsformen erstreckt:

- Anfertigung einer Seminararbeit mit einer eigenen ökonometrischen Analyse (ca. 20 Seiten ohne Berücksichtigung der Abbildungen und Tabellen, 50% der Note)
- Präsentation und Disputation der Ergebnisse (in der Regel: 30-40 Minuten, 50% der Note)

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements

- keine -

8 Status of the Module

Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Hanck	University of Duisburg-Essen (Essen), Department of Business Administration and Economics

Module: Statistical Learning					**ME6 & ME7**
M.Sc. Program: Econometrics					
Frequency irregularly	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Statistical Learning	L	3	2 SWS
1b	Statistical Learning	T	3	2 SWS

2 Language of instruction

English

3 Contents of the module

Linear regression and k-nearest neighbors, classification, resampling methods, linear model selection and regularization, Polynomial regression, splines and local regression, tree-Based methods, support vector machines, and unsupervised learning.

4 Competences

Students

- acquire comprehensive knowledge of modern statistical and econometric tools
- are capable of applying these to tackle empirical issues in economics and beyond and find and prepare appropriate data to do so and
- know how to translate an empirical question into an econometric model and critically assess empirical findings
- are proficient in assessing the formal properties of key methods and are able to derive these formally
- independently and competently use and develop statistical software and code to put empirical work into practice
- independently solve selected problem sets

5 Examination

Examination for this module takes place through a written exam (typically 60-90 minutes), an oral exam or an empirical forecasting project (70% of the final grade) combined with a presentation (typically 20 minutes, 30% of the final grade). The type of examination will be communicated at the start of the semester.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements

None.

8 Status of the Module

Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Hanck	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Statistical Modelling of Extremes					**ME7**
M.Sc. Program: Econometrics					
Frequency irregularly	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Statistical Modelling of Extremes	L	3	2 SWS
1b	Statistical Modelling of Extremes	T	3	2 SWS

2 Language of instruction
English

3 Contents of the module
Models for maxima, peaks over threshold, extremes of dependent sequences, extremes of non-stationary sequences and modelling of multivariate extremes.

4 Competences
Students

- acquire comprehensive knowledge of modern statistical and econometric tools
- are capable of applying these to tackle empirical issues in economics and beyond and find and prepare appropriate data to do so and
- know how to translate an empirical question into an econometric model and critically assess empirical findings
- are proficient in assessing the formal properties of key methods and are able to derive these formally
- independently and competently use and develop statistical software and code to put empirical work into practice
- independently solve selected problem sets

5 Examination
Examination for this module takes place through a written exam (typically 60-90 minutes), an oral exam or an empirical project (70% of the final grade) combined with a presentation (typically 20 minutes, 30% of the final grade). The type of examination will be communicated at the start of the semester.

6 Type of Examinations

covering the entire module	Relating to individual courses

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Christoph Hanck	University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Module: Statistisches Seminar					**ME7**
M.Sc. Program: Econometrics					
Frequency Sommersemester	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1	Statistisches Seminar	S	6	2

2 Language of instruction
Deutsch

3 Contents of the module
Im Rahmen des Seminars sollen die teilnehmenden Studierenden eine eigenständige empirische Auswertung eines bereitgestellten umfangreichen Datensatzes anfertigen und die Ergebnisse in einer Präsentation im Plenum vorstellen.

4 Competences
Die Studierenden
- sind befähigt empirische Analysen nachzuvollziehen und die wichtigsten methodischen Aspekte zu erläutern
- sind befähigt zur eigenständigen Anfertigung einer empirischen Analyse
- beherrschen die professionellen Darstellung der zugehörigen Ergebnisse mit Hilfe geeigneter Software
- können fachspezifische eigene aber auch fremde Fragestellungen im Plenum diskutieren und gemeinsam lösen

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung, die sich auf folgende Prüfungsformen erstreckt: Hausarbeit (15-20 Seiten) und Präsentation (in der Regel: 20-40 Minuten). Hausarbeit und Präsentation gehen zu jeweils 50% in die Modulnote ein.

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Andreas Behr	University of Duisburg-Essen (Essen), Department of Business Administration and Economics

Module: Stichprobentheorie				**ME7**
M.Sc. Program: Econometrics				
Frequency Unregelmäßig zum Sommersemester	**Duration** 1 Semester	**Study section** 1. bis 3. Semester	**Credit Points** 6	**Time** 180h

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Stichprobentheorie	V	3	2
1b	Stichprobentheorie	Ü	3	2

2 Language of instruction
Deutsch

3 Contents of the module
Stichproben stellen eine wichtige und oftmals die einzige Informationsgrundlage über interessierende Grundgesamtheiten dar. Im Rahmen der Veranstaltungen werden Methoden der Stichprobentheorie vorgestellt und am Computer umgesetzt.

Die Lehrinhalte umfassen
- Erhebungsverfahren
- einfache Stichproben
- Schichtenstichproben
- Klumpenstichproben
- Gebundene Hochrechnung

4 Competences
Die Studierenden
- kennen ausgewählte Methoden der Ziehung, Hochrechnung und Fehlerrechnung
- kennen die Vor- und Nachteile wichtiger Erhebungsmethoden
- können im jeweiligen Kontext des spezifischen Untersuchungsprojektes alternative Erhebungsmethoden bezüglich ihrer Eignung beurteilen
- sind befähigt, auf Daten aus Stichprobenerhebungen Schätzfunktionen anzuwenden und Fehlerrechnungen durchzuführen
- wenden ausgewählte empirische Methoden mit geeigneter Software eigenständig an

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung in der Gestalt einer Klausur (in der Regel: 60-90 Minuten).

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
- keine -

8 Status of the Module
Wahlmodul im M.Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Prof. Dr. Andreas Behr	University of Duisburg-Essen (Essen), Department of Business Administration and Economics

Module: Stochastic Simulation					**ME7**
M.Sc. Program: Econometrics					
Frequency irregular	**Duration** 1 semester	**Study section** 1st to 3rd semester	**Credit Points** 6	**Time** 180 h	

1 Structure of the module

No.	Courses	Type	Credit Points	Credit Hours
1a	Stochastic Simulation	L	3	2 SWS
1b	Stochastic Simulation	T	3	2 SWS

2 Language of instruction
Deutsch/English

3 Contents of the module
Vermittlung von Theorie und praktischer Durchführung von Simulationsstudien, welche statistische Berechnungen erheblich vereinfachen können. Dies beinhaltet eine Einführung in die Monte Carlo Methode, die Erzeugung von Pseudozufallszahlen, Varianzreduktion, Rare-Event Simulation, effiziente Simulation von Stochastischen Prozessen, Markov Chain Monte Carlo Methoden sowie Anwendung dieser Konzepte anhand diverser ökonomischer Beispiele.

4 Competences
Die Studierenden
- besitzen einen umfassenden Überblick über Monte Carlo Methoden
- kennen die zugrundeliegenden Algorithmen zur Simulation von geeigneten Zufallszahlen und Zufallsprozessen
- können Monte Carlo Methoden für ökonomische Analysen anwenden
- sind in der Lage eigenständig und mit Hilfe statistischer Software Simulationsstudien durchzuführen
- können selbständig ausgewählte Übungsaufgaben bearbeiten

5 Examinations
Zum Modul erfolgt eine modulbezogene Prüfung in der Gestalt einer mündlichen Prüfung (in der Regel: 20-40 Minuten).

6 Type of Examinations

Modulprüfung	Teilleistungen

7 Requirements
None.

8 Status of the Module
Elective module in M.Sc. Econometrics

9 Module Coordinator
Prof. Dr. Christoph Hanck

Responsible Department
University of Duisburg-Essen, Faculty of Business Administration and Economics, Campus Essen

Handbook of requirements for the M.Sc. study programme Econometrics

November 14, 2022

POSSIBLE REQUIREMENTS IN CASE OF CONDITIONAL ADMISSION:			
NAME	**No.**	**Lectures/courses**	**Credit Points**
MACROECONOMICS	ME Req1	Reading Course Macroeconomics	7,5
MICROECONOMICS	ME Req2	Reading Course Microeconomics	7,5
ADVANCED MATHEMATICS	ME Req3	Advanced Engineering Mathematics	7
PROBABILITY	ME Req4	Reading Course Probability	5
INFERENCE	ME Req5	Reading Course Inference	5
LINEAR MODELS	ME Req6	Reading Course Linear Models	5
MINOR INTRODUCTORY CASE STUDIES	ME Req7	Minor Introductory Case Studies	5

Module: Macroeconomics					**Module ME Req1**
M.Sc. Program: Econometrics (requirements in case of conditional admission)					
Frequency Each semester		**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 7,5	**Time** 225 h

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Reading Course Macroeconomics	reading course	7,5	-
2	**Language of instruction** English				
3	**Contents of the module** The module covers essential dynamic macroeconomic models that are required as a background for more advanced theories covered in specialized master level courses. The contents follow chapters 2 – 5 and 8 of the textbook by Michael Wickens, Macroeconomic Theory. A dynamic general equilibrium approach, 2nd ed., Princeton University Press (2011).				
4	**Competences** Students acquire knowledge of core models and methods of dynamic macroeconomics. They become familiar with intertemporal optimization and its uses in the construction of baseline models of real and monetary business cycle fluctuations and long-run growth.				
5	**Examinations** Oral exam based on the book chapters				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** -none-				
8	**Status of the Module** Possible requirement in case of conditional admission to the M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Ludger Linnemann		**Responsible Department** TU Dortmund University, Department of Business and Economics		

Module: Microeconomics					**Module ME Req2**
M.Sc. Program: Econometrics (requirements in case of conditional admission)					
Frequency Each semester		**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 7,5	**Time** 225 h

1	**Structure of the module**				
	No.	**Courses**	**Type**	**Credit Points**	**Credit Hours**
	1	Reading Course Microeconomics	reading course	7,5	-
2	**Language of instruction** English				
3	**Contents of the module** The module covers the essential microeconomic model of rational choices in a general equilibrium. The topics of this course form the theoretical foundation for the contents of more advanced master level courses. The contents follow chapters 1 – 10 and 13 of the textbook by Hal R. Varian, Microeconomic Analysis. 3rd ed., W.W. Norton (2010).				
4	**Competences** Students acquire knowledge of core models of decision theory for firms and consumers and solve problems of constraint optimization. They learn how to conduct comparative statics and gain knowledge of efficiency and welfare of a competitive equilibrium.				
5	**Examinations** Oral exam based on the book chapters				
6	**Type of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** -none-				
8	**Status of the Module** Possible requirement in case of conditional admission to the M.Sc. Econometrics				
9	**Module Coordinator** Prof. Dr. Lukas Buchheim		**Responsible Department** TU Dortmund University, Department of Business and Economics		

Module: Advanced Mathematics				**Module ME Req3**
M.Sc. study programme: Econometrics (requirements in case of conditional admission)				
Frequency Winter semester, annual	**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 7	**Time** 210 h

1 Structure of the module

No.	Lecture/Course	Type	Credit Points	Credit Hours
1	Advanced Engineering Mathematics	L + T	7	3 + 2

2 Language

English

3 Content

- Linear Algebra: Vector spaces, matrices and equation systems, linear maps, Jordan-, LU-, QR-, and singular value decomposition, numerical aspects.
- Differential Equation: Linear systems, differential equations with constant coefficients.
- Laplace-Transform: Definition, convolution and application to differential equations.
- Differential Calculus with several variables: Derivatives, inverse and implicit functions, Taylor expansion and extreme values.
- Stability of Differential Equations: Theorems of Ljapunov and Poincaré-Ljapunov.
- Variational Calculus.

Literature:

- Bajpai, Avinash C. , Mathematics for engineers and scientists
- Meyer, R.M., Essential mathematics for applied fields
- Lancaster, P., Tismenetsky, M., The theory of matrices
- Lang, S., Linear algebra
- Slides

4 Competences

The course gives an introduction to fundamental mathematical techniques used in almost every course. Attention is given to the underlying mathematical structure.

5 Examination

Written exam (2 hours).

6 Types of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Possible requirement in case of conditional admission to the M. Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Chairman of board of examiners	Mathematics

Module: Probability				**Module ME Req4**
M.Sc. study programme: Econometrics (requirements in case of conditional admission)				
Frequency every semester	**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Lecture/Course	Type	Credit Points	Credit Hours
1	Reading Course Probability	reading course	5	

2 Language

English

3 Content

- Concepts of probability, distributions, conditional probability and independence, Bayes' rule, sequences of events.
- Sampling, Binomial distribution, Normal approximation, Poisson distribution.
- Random variables, expectation and variance.
- Probability densities, Exponential and Gamma distributions, substitutions, cumulative distribution functions.
- Joint distributions, Uniform and Normal distributions.
- Dependence, conditional distributions, covariance and correlation.

Literature:

Jim Pitman: Probability. Springer 1993: Chapters 1, 2.1, 2.2, 2.5, 3.1-3.5, 4.1, 4.2, 4.4, 4.5, 5.1-5.3, 6.

4 Competences

Students gain a deep understanding of probability. They independently integrate statistical problems in the context of probability theory and solve them using appropriate methods.
Students apply mathematical proof techniques.

5 Examination

Examination based on the book chapters.

6 Types of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Possible requirement in case of conditional admission to the M. Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Chairman of board of examiners	Statistics

Module: Inference					**Module ME Req5**
M.Sc. study programme: Econometrics (requirements in case of conditional admission)					
Frequency every semester		**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 5	**Time** 150 h

1 Structure of the module

No.	Lecture/Course	Type	Credit Points	Credit Hours
1	Reading Course Inference	reading course	5	

2 Language

English

3 Content

- Parametric point estimation: method of moments and maximum likelihood; consistency; sufficiency; error, bias and loss; completeness; Rao-Cramer-bound; invariance; Bayesian estimation.
- Parametric interval estimation: confidence intervals, especially for Normal distribution parameters, finding methods, Bayesian estimation.
- Tests of hypotheses: simple and composite hypotheses, loss function, (uniformly) most powerful tests, unbiased tests, tests for (multivariate) Normal distribution parameters, Chi-square tests, relation to confidence intervals.

Literature:

Alexander M. Mood, Franklin A. Graybill, Duane C. Boes: Introduction to the Theory of Statistics. McGraw-Hill 1974: Chapters VII, VIII, IX.1-IX.6.

4 Competences

Students calculate point and interval estimators and carry out significance tests. They prove basic properties of estimators and tests.
Students apply the methods to real data.

5 Examination

Examination based on the book chapters.

6 Types of Examinations

covering the entire module	Relating to individual courses

7 Requirements

- none -

8 Status of the Module

Possible requirement in case of conditional admission to the M. Sc. Econometrics

9 Module Coordinator	**Responsible Department**
Chairman of board of examiners	Statistics

Module: Linear Models					**Module ME Req6**
M.Sc. study programme: Econometrics (requirements in case of conditional admission)					
Frequency every semester		**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 5	**Time** 150 h

1	**Structure of the module**				
	No.	**Lecture/Course**	**Type**	**Credit Points**	**Credit Hours**
	1	Reading Course Linear Models	reading course	5	-
2	**Language** English				
3	**Content** • Introduction to regression models: real data examples, simple and multiple linear models, binary response models. • Linear model components: parameters, covariates, residuals, assumptions. • Parameter estimation: coefficients and error variance. • Hypothesis tests and confidence intervals: F-Tests, confidence regions, prediction intervals. • Model choice: variable selection, prediction evaluation, criteria. **Literature**: Thomas Kneib, Stefan Lang, Ludwig Fahrmeir, Brian D. Marx: Regression: Models, Methods and Applications. Springer 2015: Chapters 1, 2.1-2.3, 3.				
4	**Competences** Students calculate point and interval estimators and carry out significance tests in the context of the linear model. They have knowledge on model selection. Students apply the methods to real data.				
5	**Examination** Examination based on the book chapters.				
6	**Types of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none -				
8	**Status of the Module** Possible requirement in case of conditional admission to the M. Sc. Econometrics				
9	**Module Coordinator** Chairman of board of examiners		**Responsible Department** Statistics		

Module: Minor Introductory Case Studies					**Module ME Req7**
M.Sc. study programme: Econometrics (requirements in case of conditional admission)					
Frequency every semester	**Duration** 1 semester	**Semester** beginning of programme	**Credit Points** 5	**Time** 150 h	

1	**Structure of the module**				
	No.	**Lecture/Course**	**Type**	**Credit Points**	**Credit Hours**
	1	Minor Introductory Case Studies (parts of the course "Fallstudien I" of the module BD 17 of the Bachelor programme Data Science)	P	5	4 (for 3/7 of the sem.)
2	**Language** English, enclosed in a German course				
3	**Content** The aim of the course is to familiarise students with the independent evaluation of statistical data sets. In addition to the provision of a catalogue of basic standard procedures for data evaluation, a central learning objective is the appropriate presentation of the methodological approach and the evaluation results in verbal and written form. In order to achieve these learning goals, students have to work in small groups (three to four members) on projects for a total of 3 method complexes. The time frame for each project is one to two weeks, depending on the level of difficulty. The intermediate and final results of the statistical evaluation are presented alternately by the groups. After completion of each project, each student must write a short, written report in which the results achieved in the group and the methodology used are presented in an appropriate manner. Data Science Master students work on the first 3 of 5 projects.				
4	**Competences** Students work independently according to scientific criteria and report orally and in writing on their work. Students apply statistical methods to real data sets, modify the methods if necessary and work out methods unknown to them. They derive solutions to problems and reflect on them. They work together in groups. They prepare and give presentations, explaining statistical methods and communicating results. They discuss their own and other methods, results and reports with others. They complete the projects within a short, given time.				
5	**Examination** Written reports and oral presentations.				
6	**Types of Examinations**				
	covering the entire module		Relating to individual courses		
7	**Requirements** - none -				
8	**Status of the Module** Possible requirement in case of conditional admission to the M. Sc. Econometrics				
9	**Module Coordinator** Chairman of board of examiners		**Responsible Department** Statistics		