

# **Exemplary elective options for different specialization tracks (starting in the winter semester)**

Each student must choose (exactly) one specialization. Prior enrollment in a particular specialization is not required. The area of specialization is finally determined by the choice of the corresponding seminar. In particular, it is possible to attend lectures from different modules during the first semester(s) in order to get an overview.

For students starting in the winter semester, this document shows two paths through each specialization track. These paths are examples only and can be easily adapted to individual preferences and interests. Indeed, this is just an informal presentation; only the study and examination regulations are legally binding.

For detailed information on each module, please refer to the module catalog; see also the corresponding course description on Moodle.

## **Colour code (ECTS points awarded for successful completion of a module are given in brackets)**

xxxxx mandatory for all students

xxxxx mandatory when choosing the respective specialisation track

xxxxx potential choice within the respective specialisation track

# Machine Learning

Semester	Classical	Computational Methods
1	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Optimization (6)</p> <p>Causal Inference (6)</p>	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Optimization (6)</p> <p>Survival Analysis (6)</p>
2	<p>Consulting I (3)</p> <p>Statistical Inference (9)</p> <p>Deep Learning (6)</p> <p>Advanced Machine Learning (6)</p> <p>Machine Learning in Econometrics (6)</p>	<p>Consulting I (3)</p> <p>Statistical Inference (9)</p> <p>Deep Learning (6)</p> <p>Advanced Machine Learning (6)</p> <p>Analysis of High-dimensional Biological Data (6)</p>
3	<p>Consulting II (9)</p> <p>Seminar: Machine Learning (9)</p> <p>Automated Machine Learning (6)</p> <p>Current Research in Machine Learning (6)</p>	<p>Consulting II (9)</p> <p>Seminar: Machine Learning (9)</p> <p>Automated Machine Learning (6)</p> <p>Advanced Programming (6)</p>
4	<p>Master's Thesis + Disputation (30)</p>	<p>Master's Thesis + Disputation (30)</p>

## Methodology and Modeling

Semester	Theoretical Focus	Applied Focus
<b>1 (winter)</b>	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Survival Analysis (6)</p> <p>Stochastic Processes (6)</p>	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Survival Analysis (6)</p> <p>Basic Concepts and Structures in Official Statistics (6)</p>
<b>2 (summer)</b>	<p>Consulting I (3)</p> <p>Statistical Inference (9)</p> <p>Regression for Correlated Data (6)</p> <p>Decision Theory (6)</p> <p>Methodological Discourses in Statistics and Data Science (6)</p>	<p>Consulting I (3)</p> <p>Statistical Inference (9)</p> <p>Regression for Correlated Data (6)</p> <p>Decision Theory (6)</p> <p>Applied Machine Learning (6)</p>
<b>3 (winter)</b>	<p>Consulting II (9)</p> <p>Seminar: Methodology and Modelling (9)</p> <p>Measurement and Modelling in Social Sciences (6)</p> <p>Advanced Statistical Modelling (6)</p>	<p>Consulting II (9)</p> <p>Seminar: Methodology and Modelling (9)</p> <p>Design of Experiments (6)</p> <p>Advanced Programming (6)</p>
<b>4 (summer)</b>	<p>Master's Thesis + Disputation (30)</p>	<p>Master's Thesis + Disputation (30)</p>

## Econometrics

Semester	Classical	Data Science
1	Statistical Modelling (12) Supervised Learning (6) Causal Inference (6) Survival Analysis (6)	Statistical Modelling (12) Supervised Learning (6) Causal Inference (6) Optimization (6)
2	Consulting I (3) Statistical Inference (9) Econometric Theory (6) Machine Learning in Econometrics (6) Decision Theory (6)	Consulting I (3) Statistical Inference (9) Econometric Theory (6) Machine Learning in Econometrics (6) Deep Learning (6)
3	Consulting II (9) Seminar: Econometrics (9) Current Research in Econometrics (6) Nonparametric Econometrics(6)	Consulting II (9) Seminar: Econometrics (9) Current Research in Econometrics (6) Current Research in Machine Learning (6)
4	Master's Thesis + Disputation (30)	Master's Thesis + Disputation (30)

## Social Statistics and Data Science

Semester	Classical	EMOS
1	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Complex Samples and Data Structures (6)</p> <p>Measurement and Modelling in Social Sciences (6)</p>	<p>Statistical Modelling I (9)</p> <p>Supervised Learning (6)</p> <p>Basic Concepts and Structures in Official Statistics (6)</p> <p>Complex Samples and Data Structures (6)</p> <p>Selected Topics of Social Science and Data Science (3)</p>
2	<p>Consulting I (3)</p> <p>Statistical Inference (9)</p> <p>Data Collection and Questionnaire Design (6)</p> <p>Decision Theory (6)</p> <p>Advanced Methods in Social Statistics and Data Science (6)</p>	<p>Statistical Inference (9)</p> <p>Statistical Modelling II (3)</p> <p>Official Statistics on Households, Enterprises, Economies, and Populations (6)</p> <p>Data Collection and Questionnaire Design (6)</p> <p>Decision Theory (6)</p>
3	<p>Consulting II (9)</p> <p>Seminar: Social Statistics and Data Science (9)</p> <p>Computational Social Science (6)</p> <p>Advanced Statistical Modeling (6)</p>	<p>EMOS Internship (12)</p> <p>EMOS Colloquium (3)</p> <p>Seminar: EMOS (9)</p> <p>Computational Social Science (6)</p>
4	<p>Master's Thesis + Disputation (30)</p>	<p>Master's Thesis + Disputation (30)</p>

# Biostatistics

Semester	Classic	Focus Data Science
<b>1 (winter)</b>	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Preclinical and Clinical Studies (6)</p> <p>Survival Analysis (6)</p>	<p>Statistical Modelling (12)</p> <p>Supervised Learning (6)</p> <p>Preclinical and Clinical Studies (6)</p> <p>Survival Analysis (6)</p>
<b>2 (summer)</b>	<p>Statistical Inference (9)</p> <p>Diagnostic Accuracy Studies (6)</p> <p>Analysis of High-dimensional Biological Data (6)</p> <p>Selected Software for Applied Statistics (SAS) (3)</p> <p>Design of Experiments (6)</p>	<p>Statistical Inference (9)</p> <p>Diagnostic Accuracy Studies (6)</p> <p>Analysis of High-dimensional Biological Data (6)</p> <p>Selected Software for Applied Statistics (SAS) (3)</p> <p>Deep Learning (6)</p>
<b>3 (winter)</b>	<p>Seminar: Biostatistics (9)</p> <p>Consulting (12)</p> <p>Selected Topics of Biostatistics (3)</p> <p>Statistical Methods in Epidemiology (6)</p>	<p>Seminar: Biostatistics (9)</p> <p>Consulting II (12)</p> <p>Advanced Methods in Biostatistics (6)</p> <p>Selected Topics of Machine Learning (3)</p>
<b>4 (summer)</b>	<p>Master's Thesis + Disputation (30)</p>	<p>Master's Thesis + Disputation (30)</p>