Master of Science (M.Sc.)

“Mannheim Master in Social Data Science”

University of Mannheim

– Module catalog –

for students starting in or after fall 2024

Academic Year
HWS 2024/ FSS 2025

Content

Foreword

This document describes the courses that will be offered in HWS 2024/ FSS 2025 for students studying M. Sc. Mannheim Master in Social Data Science (Examination Regulations for the Master's program from 26th April 2023). You can find the Examination Regulations on the website of the Student Services (Studienbüros):

https://www.uni-mannheim.de/en/academics/during-your-studies/examinations/examination-regulations/

It is possible that additional courses will be made available during the course of the academic year. These will be published in an appendix available on the following web page:

Website noch in Arbeit

A. Overview

		ECTS
Foundations of Data Science	Five courses	27
Data Science Methods: Fundamentals	Three courses	27
Data Science Methods: Specializations	Minimum of three courses from the Areas "Data Management" or "Data Analytics Methods" of the MMDS Curriculum	18-23
Data Science Applications	At least two Master elective courses from the School of Social Sciences	18-23
Master's Thesis	Six-months-long written academic assignment	30
Total		120

General constraints:

1. Courses with 3-10 ECTS can be taken
2. All Foundations of Data Science courses worth a combined 27 ECTS must be taken
3. All Data Science Methods: Fundamentals courses worth a combined 27 ECTS must be taken
4. Three Data Science: Specializations courses must be taken (18-23 ECTS)
5. At least two Master elective courses from the School of Social Sciences (18-23 ECTS) must be taken in Data Sciences Applications.
6. You must write a Master Thesis

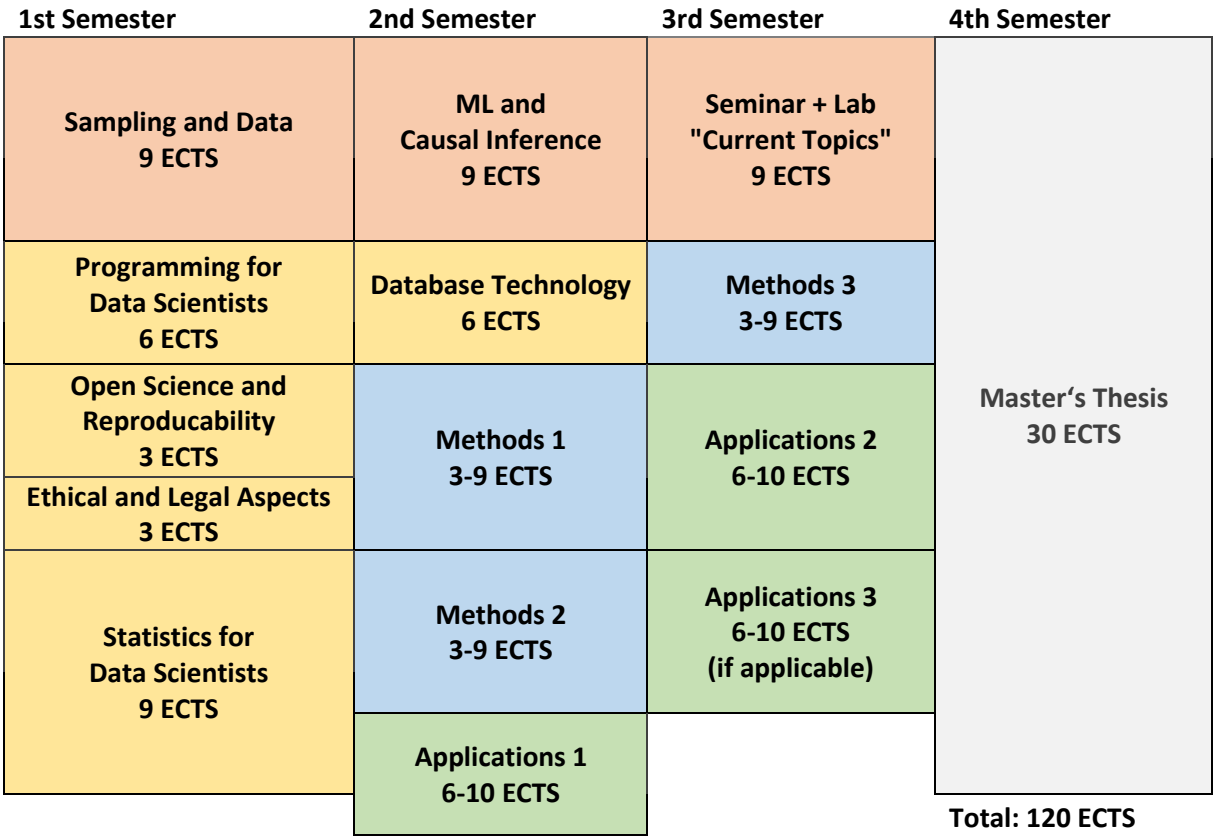
Abbreviations:

HWS (Herbst-/Wintersemester): Course is offered in the respective Fall semester

FSS (Frühjahrs-/Sommersemester): Course is offered in the respective Spring semester

FSS/HWS: course is offered both in Spring semester and Fall semester

Example Study Plan


1st Semester
2nd Semester
3rd Semester
4th Semester
Sampling and Data
9 ECTS
ML and
Causal Inference
9 ECTS
Seminar + Lab
"Current Topics"
9 ECTS
Programming for
Data Scientists
6 ECTS
Database Technology
6 ECTS
Methods 3
3-9 ECTS
Open Science and
Reproducability
3 ECTS
Methods 1
3-9 ECTS
Applications 2
6-10 ECTS
Master's Thesis
30 ECTS
Ethical and Legal Aspects
3 ECTS
Statistics for
Data Scientists
9 ECTS
Methods 2
3-9 ECTS
Applications 3
6-10 ECTS
(if applicable)
Applications 1
6-10 ECTS
Total: 120 ECTS
Foundations of Data Science
Data Science Methods: Fundamentals
Data Science Methods: Specialization
Data Science Applications

B. Foundations of Data Science

1. Overview

2. Detailed descriptions

DS 100	**Statistics for Data Scientists**
Form of module	Lecture and Tutorial
Type of module	Foundations of Data Science
Level	Master
ECTS	9 (270 hours)
Workload	Hours per semester present: 56 h (4 SWS)
	Self-study: 152 h per semester • 91 h: pre and post lecture/tutorial studying and revision • 42 h: studying for and taking weekly online tests • 40 h: examination preparation • 41 h: preparation and presentation of weekly exercises
Prerequisites	A sound understanding of the linear regression model (OLS) is required. Knowledge in linear algebra and calculus is useful. This is the first in a two-course sequence covering statistical models and causal inference, continuing into Data Science 201 next semester. The topics in both courses will be integrated through the year. It is expected that students will take both semesters.
Aim of module	The course provides an introduction to generalized linear models (GLM) and maximum likelihood estimation. The course will cover the following topics: • Maximum Likelihood Estimation • Hypotheses testing • Selected GLM, e.g., binary choice models, models for ordinal data, models multinomial data, models for count data
Learning outcomes and qualification goals	Expertise (MK1, MK3): Understand how to appropriately translate research question into statistical models, be able to apply statistical models appropriate for non-linear problems and learn how to present and interpret estimation results in a substantive meaningful way.
	Methodological competence (MK1, MK3): Estimate regression parameters using the maximum likelihood principle; Perform hypothesis tests for regression models using

	the maximum likelihood principle; Be able to identify violations of the respective regression assumptions of the discussed GLMs; Be able to identify limitations of non-linear regression models.
	Personal competence (MF1, MF2, MF3, MKO1, MKO2): The course supports students to develop competences with regard to choosing the appropriate statistical method(s) to answer respective research questions and how to present and communicate statistical results.
Media	Lecture slides available online, exercises available online
Literature	• Cameron, C.A. and P.K. Trivedi. 1998. Regression Analysis of Count Data. Cambridge: Cambridge University Press. • Greene, W.H. (2008). Econometric Analysis. 6th ed. Upper Saddle River: Prentice Hall. • Long, J.S. (1997). Regression Models for Categorical and Limited Dependent Variables. Thousand Oaks: Sage. • Verbeek, M. 2017. A Guide to Modern Econometrics. 5th ed. Chichester: Wiley. • Wooldridge, J.M. 2002. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: MIT Press.
Methods	Lecture elements, weekly online tests, literature studies
Form of assessment	Written examination
Admission requirements for assessment	Oral participation, homework, presentations, compulsory attendance
Duration of assessment	90 Minutes
Language	English
Offering	Fall semester
Lecturer	Prof. Dr. Marc Ratkovic
Person in charge	Prof. Dr. Marc Ratkovic
Duration of module	1 semester
Further modules	
Range of application	MMSDS

Semester	1st semester

CS 460	**Databases for Data Scientists**
Form of module	Lecture with Exercise
Type of module	Foundations of Data Science (MMSDS) Fundamental (MMDS for students who started before 2024)
Level	Master
ECTS	6
Workload	Hours per semester present: 56 h (4 SWS)
	Self-study per semester: 98 h • 70 h: pre and post lecture studying and revision • 28 h: examination preparation
Prerequisites	-
Aim of module	The course provides an introduction to data storage and database systems. The course will cover the following topics: • Principles of data storage • Relational modelling • Query languages for relational databases (SQL) • Keys and normal forms • Hash and index structures • Concurrency • Databases for non-relational data • Principles of data integration
Learning outcomes and qualification goals	Expertise: Basic understanding of data storage, relational data modelling and database design, as well as the functionality of relational database management systems, query handling, and transaction management. Handling non-relational data. (MK1, MK 2, MK3)
	Methodological competence: Abstraction, modelling, complexity consideration. (MF1, MF2)
	Personal competence: Understanding the role of data management in enterprises. (MK01, MK02)
Media	Electronic slides and exercise sheets

Literature	Avi Silberschatz, Henry F. Korth, S. Sudarshan: Database System Concepts
Methods	The course consists of a lecture together and exercises. The exercises encompass both theoretical exercises as well as practical assignments, which are conducted with a free modern database management system and allow the students to deepen their theoretical understanding of the course contents, as well as to gather hands-on experience with database management systems.
Form of assessment	Written or oral examination
Admission requirements for assessment	-
Duration of assessment	60 minutes (written exam)/30 minutes (oral exam)
Language	English
Offering	Spring semester
Lecturer	Prof. Dr. Heiko Paulheim
Person in charge	Prof. Dr. Heiko Paulheim
Duration of module	1 semester
Further modules	Database Systems II, Large Scale Data Management, Web Data Integration
Range of application	MMSDS, MMDS (for students who started before HWS 2024)
Semester	1st/2nd semester

CS 450	**Programming for Data Scientists**
Form of module	Lecture with Exercise
Type of module	Foundations of Data Science
Level	Master
ECTS	6
Workload	Hours per semester present: 56h (4 SWS)
	Self-study: 84h per semester • 28h: pre and post lecture studying and revision • 56h: preparation and presentation of tutorial exercises
Prerequisites	None (programming skills recommended)
Aim of module	The course will provide data scientists with the knowledge they need to be able to apply Python3 in data science projects. It assumes that students have basic knowledge of a programming language, but does not assume any prior Python knowledge. Topics covered include – • The Python interpreter & programming paradigms • Basic expressions & control flow statements • Functions & scoping • Data structures • Modules • Classes & object-oriented concepts • Errors and exceptions • Testing and debugging • Exploring & visualizing data with Python

Learning outcomes and qualification goals	Expertise: After taking the course, students will be familiar with Python3 and will be able to use it in data science projects
	Methodological competence: Students will acquire the skills to develop high-quality Python software for data science and other applications
	Personal competence: • ability to work independently • ability to work in a team
Media	Projector, PC (Linux), printed lecture slides
Literature	• Introduction to Computation and Programming Using Python, Third Edition (John. V. Guttag), MIT Press • Think Python: How to Think Like a Computer Scientist, 2nd Edition, Allen B. Downey, O`Reilly • The (Official) Python Tutorial
Methods	lectures, tutorials/practical sessions, independent study
Form of assessment	Programming test
Admission requirements for assessment	Successful completion of several small programming exercises and of a programming project in a small team
Duration of assessment	120 minutes
Language	English
Offering	Fall Semester
Lecturer	Dr. Ursula Rost
Person in charge	Dr. Ursula Rost
Duration of module	1 semester
Further modules	-
Range of application	MMSDS
Semester	1st/2nd semester

	Legal and Ethical Aspects of Privacy
Detailed description	See module catalog MMDS
Type of module	Foundations of Data Science
Level	Master
Form of assessment	Written examination
Duration of assessment	90 Minutes
Duration of module	1 semester
Further modules	-
Range of application	MMSDS, MMDS
Semester	1st semester

DS 500	**Open Science & Reproducible Research**
Form of module	Lecture + Exercise
Type of module	Foundations of Data Science
Level	Master
ECTS	3 (90 hours)
Workload	Hours per semester present: 28 h (2 SWS)
	Self-study: 62 h per semester • 28 h: pre and post lecture studying and revision • 34 h: exercises + report writing
Prerequisites	-
Aim of module	This course deals with Open Science which focuses in openness, transparency and reproducibility in research. Students learn about Open Science practices like Open Data, Open Materials, and Open Access to published research. Reproducible research and questions around replications are covered as well. In addition, students will gain practical skills in Open Science and reproducible research (e.g., pre-registration, code documentation, research data management and planning).
Learning outcomes and qualification goals	Expertise: The students will know Open Science principles and understand how reproducible research can be done. (MK1, MK3)
	Methodological competence: Students will be able to implement a diverse range of Open Science practices tailored for their research purposes. (MF1, MF4)
	Personal competence: Students will be able to assess where and which Open Science practices can be implemented within their own and others' research. (MKO1)
Media	Lecture slides and exercises will be available online
Literature	• Christensen, G., Freese, J., & Miguel, E. (2019). *Transparent and reproducible social science research: How to do open science*. University of California Press.

	• Miedema, F. (2022). Open science: The very idea. Springer Nature.
Methods	This course consists of weekly lectures and practical exercises. The concepts and skills acquired during lectures and workshops will then be applied to an independent final written report (e.g. reporting the attempt of reproducing results from previous research).
Form of assessment	Written report, 5-10 pages
Admission requirements for assessment	Oral participation, Practical work, presentations (10 - 90 minutes)
Duration of assessment	4-8 weeks (writing of the report).
Language	English
Offering	Fall semester
Lecturer	Dr. David Philip Morgan, Open Science Office Dr. Philipp Zumstein
Person in charge	Dr. David Philip Morgan, Open Science Office Dr. Philipp Zumstein
Duration of module	1 semester
Further modules	
Range of application	MMSDS
Semester	3rd semester

C. Data Science Methods: Fundamentals

1. Overview

DS 200	**Sampling and Data**
Form of module	Lecture and Tutorial
Type of module	Data Science Methods: Fundamentals
Level	Master
ECTS	9 (270 hours)
Workload	Hours per semester present: 56 h (4 SWS)
	Self-study: 214 h per semester • 91 h: pre and post lecture studying and revision • 42 h: studying for and taking weekly online tests • 41 h: preparation and presentation of weekly exercises • 40 h: examination preparation
Prerequisites	-
Aim of module	The course introduces the most important social scientific forms of research and data collection methods. Hands-on analysis will occur with Bayesian models as well as language models.
Learning outcomes and qualification goals	Expertise: Students can independently formulate research questions and empirically verifiable hypotheses. (MK1)
	Methodological competence: Students know different data collection methods and their advantages and disadvantages; they are able to assess the appropriateness of the methods used to answer various questions; they understand and critically evaluate the design of empirical studies. (MK1)
	Personal competence: The course supports students to develop competences with regard to choosing the appropriate research design and sampling frame. (MF2, MKO1, MKO2)
Media	Lecture slides available online

Literature	• McElreath, Richard. 2020. Statistical Rethinking: A Bayesian Course with Examples in R and STAN. Routledge. • Martin and Jurafsky. 2024. Speech and Language Processing. Available at https://web.stanford.edu/~jurafsky/slp3/. • Salganik, M. 2017. Bit by Bit: Social Research in the Digital Age. Princeton, NJ: Princeton University Press. • Foster et al. 2020. Big Data and Social Science: A Practical Guide to Methods and Tools. 2nd Edition. Boca Raton, FL: CRC Press.
Methods	Lecture elements, weekly online tests, literature studies
Form of assessment	Written examination
Admission requirements for assessment	Oral participation, homework, presentations, compulsory attendance
Duration of assessment	90 Minutes
Language	English
Offering	Fall semester
Lecturer	Prof. Dr. Marc Ratkovic
Person in charge	Prof. Dr. Marc Ratkovic
Duration of module	1 semester
Further modules	
Range of application	MMSDS
Semester	1st semester

DS 201	**Machine Learning and Causal Inference**
Form of module	Lecture and Tutorial
Type of module	Data Science Methods: Fundamentals
Level	Master
ECTS	9 (270 hours)
Workload	Hours per semester present: 56 h (2 SWS)
	Self-study: 214 h per semester • 91 h: pre and post lecture studying and revision • 42 h: studying for and taking weekly online tests • 41 h: preparation and presentation of weekly exercises • 40 h: examination preparation
Prerequisites	A sound understanding of basic statistical methods incl. regression analysis, estimation methods (OLS, MLE), and statistical inference is required. Knowledge in linear algebra and calculus is useful. This is the second in a two-course sequence covering statistical models and causal inference. The topics in both courses (DS 100 and DS 201) will be integrated through the year. It is expected that students will take both semesters.
Aim of module	The course aims to introduce students to advanced causal inference and machine learning methods, discussing models in detail. It first deals with causal inference topics, for instance, synthetic control and its extensions, causal inference in panel and difference-in-difference models. The course also covers estimating mediation effects, controlled direct effects, and gives an introduction to directed acyclic graphs (DAGs). The second part of the course then discusses a theory of causal estimation and the role of machine learning in estimating these effects. Advanced and popular techniques of machine learning are introduced.
Learning outcomes and qualification goals	Expertise: Students are aware of how machine learning can help answer causal questions; they can analyze (large) data sets using popular techniques of machine learning. (MK1)

	Methodological competence: Students are able to translate their research question(s) into a causal framework; they can apply different techniques of machine learning. (MK1, MK3)
	Personal competence: The course supports students to develop competences with regard to choosing the appropriate statistical method(s) to answer respective research questions. (MF1, MF2, MF4, MKO1, MKO2)
Media	Lecture slides available online
Literature	• Angrist, Joshua D., and Jörn-Steffen Pischke. 2009. Mostly Harmless Econometrics: An Empiricist's Companion. Princeton: Princeton University Press. • Murphy, Kevin P. 2012. Machine Learning: A Probabilistic Perspective. Cambridge: MIT Press. • Hastie, Trevor, Robert Tibshirani, and Jerome Friedman. 2008. The Elements of Statistical Learning. 2nd ed. New York: Springer. • Imbens, Guido W., and Donald B. Rubin. 2015. Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction. Cambridge: Cambridge University Press. • Morgan, Stephen L., and Christopher Winship. 2007. Counterfactuals and Causal Inference. Cambridge: Cambridge University Press.
Methods	Lecture elements, weekly online tests, literature studies
Form of assessment	Written examination
Admission requirements for assessment	Oral participation, homework, presentations, compulsory attendance
Duration of assessment	90 Minutes
Language	English
Offering	Spring semester
Lecturer	Prof. Dr. Marc Ratkovic
Person in charge	Prof. Dr. Marc Ratkovic
Duration of module	1 semester

Further modules	
Range of application	MMSDS
Semester	2nd semester

DS 202	**Seminar and Lab on Machine Learning and Causal Inference**
Form of module	Seminar
Type of module	Data Science Methods: Fundamentals
Level	Master
ECTS	9 (270 hours)
Workload	Hours per semester present: 56 h (4 SWS)
	Self-study: h per semester • 70 h: pre and post seminar studying and revision • 70 h: analyzing data, programming Python or R scripts • 74 h: preparation and presentation of research project
Prerequisites	Students should be familiar with Python or R or at least with any other object-programming language.
Aim of module	The module introduces, discusses, and offers hands-on experience in state-of-the-art topics in data science. It consists of a "theoretical" part (seminar) which offers room for discussion on hot topics of data science and an "empirical" part where students formalize research questions and analyze data (of their own) using advanced techniques of machine learning.
Learning outcomes and qualification goals	Expertise: Students are able to find appropriate techniques of machine learning to answer complex research questions; they can analyze (large) data sets using state-of-the-art techniques of machine learning. (MK1)
	Methodological competence: Students are able to program in Python or R; they can apply advanced techniques of machine learning to individual research questions; they have in-depth knowledge in application of data science. (MK1, MK2, MK3)
	Personal competence: Students are able to independently implement their research question in a research project; they can deal with and solve theoretical and empirical problems. (MF1, MF2, MF3, MF4, MKO1, MKO2)

Media	Slides available online
Literature	• McElreath, Richard. 2020. Statistical Rethinking: A Bayesian Course with Examples in R and STAN. Routledge. • Martin and Jurafsky. 2024. Speech and Language Processing. Available at https://web.stanford.edu/~jurafsky/slp3/. • Downey, Allen B. 2016. Think Python. How to Think Like a Computer Scientist. 2nd ed. Needham: Green Tea Press. (available online: http://greenteapress.com/thinkpython2/thinkpython2.pdf) • Guttag, John V. 2021. Introduction to Computation and Programming Using Python. 3rd. ed. Cambridge: MIT Press. • The Python Tutorial (online: https://docs.python.org/3/tutorial/)
Methods	Lecture elements, classroom discussion, weekly lab-sessions, literature studies
Form of assessment	Written examination
Admission requirements for assessment	Oral participation, homework, presentations, compulsory attendance
Duration of assessment	90 Minutes
Language	English
Offering	Fall semester
Lecturer	Prof. Dr. Marc Ratkovic
Person in charge	Prof. Dr. Marc Ratkovic
Duration of module	1 semester
Further modules	
Range of application	MMSDS
Semester	3rd semester

D. Data Science Methods: Specialization

1. Overview

Module no.	Name of Module	Offered	ECTS	Page
CS 500	Advanced Software Engineering	HWS	6	MMDS*
CS 550	Algorithmics	FSS/HWS	6	MMDS*
CS 560	Large Scala Data Management	HWS	6	MMDS*
CS 600	Model-driven Development	HWS	6	MMDS*
CS 646	Higher Level Computer Vision	HWS	6	MMDS*
CS 647	Image Processing	HWS/FSS	6	MMDS*
CS 651	Cryptography II	HWS	6	MMDS*
CS 655	Cryptography	FSS	6	MMDS*
CS 662	Types and Programming Languages	FFS	6	MMDS*
CS 664	Blockchain Security	HWS	6	MMDS*
CS 668	Generative Computer Vision Models	FSS	6	MMDS*
IE 500	Data Mining	HWS/FSS	6	MMDS*
IE 560	Decision Support	HWS	6	MMDS*
IE 663	Information Retrieval and Web Search	HWS	3	MMDS*
IE 686	Large Language Models and Agents	HWS	3	MMDS*
IE 670	Web Data Integration	HWS	3	MMDS*
IE 671	Web Mining	FSS	3	MMDS*
IE 675b	Machine Learning	HWS	9	MMDS*
IE 678	Deep Learning	FSS	6	MMDS*
IE 683	Web Data Integration Project	HWS	3	MMDS*
IE 684	Web Mining Project	FSS	3	MMDS*
IE 691	Information Retrieval Project	HWS	3	MMDS*
IE 692	Advanced Process Mining**	FSS	6	MMM*
IE 696	Advanced Methods in Text Analytics	FSS	6	MMDS*
IS 556	Public Blockchains	FSS	6	MMM*
IS 616	Large Scale Data Analysis and Visualization	HWS	6	MMM*

IS 661	Text Analytics	HWS	6	MMM*
IS 622	Network Science	FSS	6	MMM*
	Any other elective from MMDS	FSS/HWS	3-6	MMDS*

* For a detailed description, please see the module catalogs of the respective following degree programs:

- MMDS: Mannheim Master in Data Science
  https://www.wim.uni-mannheim.de/studium/studienorganisation/mannheim-master-in-data-science
  (only courses form the modules "Data Management" and "Data Analytics Methods" are allowed
- MMM: Mannheim Master in Management
  https://www.bwl.uni-mannheim.de/studium/master/mmm/#c176637
- Choose courses to match 18-23 ECTS

**The number of this module will change (TBA)

E. Data Science Applications

1. Overview

Module no.	Name of Module	Offered	ECTS	Page
	Elective MA Pol, School of Social Sciences	FSS/HWS	8-10	MA Pol*
	Elective MA Soc, School of Social Sciences	FSS/HWS	6	MA Soc*
	Elective MA Psy, School of Social Sciences	FSS/HWS	4	M.Sc. Psy*
CS 630	Generative Software Engineering	FSS	6	MMDS*
IE 697	Data Science in Action	HWS	6	MMDS*
IE 694	Industrial Applications of Artificial Intelligence	FSS	6	MMDS*
DA 110	Computational Analysis of Communication	HWS/FSS	6	MMDS*
	Themenseminar Digitale Medien	FSS	6	MKW*
	Course from "Methodenmodul Grundlagen"	HWS	6-10	MKW*
	Course from "Methodenmodul Vertiefung"	FSS/HWS	6-7	MKW*

* For a detailed description, please see the module catalogs of the respective following degree programs:

- MA Pol: Master of Arts in Political Science
  https://www.sowi.uni-mannheim.de/studium/studierende/politikwissenschaft/ma-political-science/
- MA Soc: Master of Arts in Sociology
  https://www.sowi.uni-mannheim.de/studium/studierende/soziologie/ma-sociology/

- M.Sc. Psy: Master of Science Psychologie - Arbeit, Wirtschaft, Gesellschaft (only in German) https://www.sowi.uni-mannheim.de/en/academics/students/psychology/msc-in-psychology-work-economy-and-society/
- MMDS: Mannheim Master in Data Science https://www.wim.uni-mannheim.de/studium/studienorganisation/mannheim-master-in-data-science
- Master Medien und Kommunikationswissenschaft https://www.phil.uni-mannheim.de/studium/modulkataloge/#c111078
- For detailed information about offered modules by the School of Social Sciences (MA Pol, MA Soc and M.Sc. Psy) and in Master Medien and Kommunikationswissenschaften (MKW), please refer to Portal[2].
- Choose at least two electives from the School of Social Sciences
- Choose courses to match 18-23 ECTS

F. Master's Thesis

	Master's Thesis
Form of module	Master's Thesis
Type of module	Thesis
Level	Master
ECTS	30 (900 hours)
Workload	Self-study: 900 h per semester
Prerequisites	-
Aim of Modules	Develop a deep understanding of an advanced topic of social data science
Learning outcomes and qualifications goals	Expertise: The student has a deep understanding of an advanced topic. (MK1)
	Methodological competence: The student is familiar with methods for analysing and independently solving advanced, complex problems. (MK1, MK2, MK3)
	Personal competence: The student has the capability to understand, analyse and independently find solutions to advanced, complex problems. The student has the capability to assess and understand the state-of-the-art in social sciences and data science and adapt the latest technologies and methods to solve real world problems. The student is able to present a complex topic in written and oral form in a clear and understandable way. (MF1, MF2, MF3, MF4, MKO2, MKO3)
Media	Various
Literature	Topic dependent
Methods	Independent research work
Form of Assessment	Written thesis, 10-120 pages
Admission requirements for assessment	To be permitted to write the master thesis, the student is to obtain at least 60 ECTS
Duration of Assessment	6 months (execution of the thesis work and writing of the thesis manuscript).

Langauges	English only
Offering	Every semester
Person in Charge	Examiners: University teachers, auxiliary professors, honorary professors and senior academic staff members of the School of Social Sciences, the Business School, the School of Humanities, or the School of Business Informatics and Mathematics.
Duration of module	1 semester
Further modules	-
Range of Applications	MMSDS
Semester	4th semester

Abbreviations

Explanation of abbreviations

Knowledge

This degree program provides students with a solid theoretical foundation as well as practical skills for data management and data analytics methods. The courses are divided into two groups – fundamental courses and advanced courses. After studying optional fundamental courses in computer science and empirical social sciences, in their advanced courses students can focus on the concepts and methods of computers science and advanced empirical methods and the application of these methods.

During their studies -

(MK1) all students develop a deep understanding of the relevant concepts, methods and problem solving strategies used in different application domains.

(MK2) technology-oriented students learn the concepts, algorithms and strategies used to solve concrete, practical application-oriented problems in informatics.

(MK3) social sciences-oriented students develop a deep understanding of how to set up, analyse and interpret advanced empirical research questions.

As part of this education, students become familiar with a wide range of models, modelling languages, methods and tools. Regardless of their specialization, students also learn how to collect, structure, manipulate, prepare, interpret, communicate and use data, information and knowledge.

Capabilities

After completing their studies, students have the ability to –

(MF1) apply a wide range of abstraction and analysis techniques.

(MF2) understand, interpret, describe and present relevant scientific publications.

(MF3) exploit the latest scientific results.

(MF4) independently tackle problems in data management and analytics and describe their results in a structured, written form.

(MF5) continue their studies at the PhD level, if their results are of sufficient quality.

Competencies

After completing their studies, students have the competences needed to –

(MKO1) apply their knowledge and capabilities to solve specific problems in a team context.

(MKO2) use their interdisciplinary education to mediate between technical and non-technical individuals.

(MKO3) evaluate the latest changes in programming languages, systems, models and, wherever possible, exploit them to develop better solutions to data-science related problems.