

Master of Science (M.Sc.)
„Mannheim Master in Data Science“

University of Mannheim

– Module catalog –

Appendix

Academic Year

HWS 22/23

Die folgenden Veranstaltungen wurden nach Veröffentlichung des Modulkatalogs dem Kursprogramm hinzugefügt.

B. Fundamentals

Modulnr.	Name des Moduls	Semester	Sprache	ECTS	Seite
IS 557	Scientific Programming with Python**	HWS	E	6	MMM*

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

- MMM: M.Sc. Mannheim Master in Management, <https://www.bwl.uni-mannheim.de/studium/master/mmm/>

**Prerequisites: No completed exam in CS 470 Programming with Python

C. Data Management

Modulnr.	Name des Moduls	Semester	Sprache	ECTS	Seite
CS 664	Blockchain Security	HWS	E	6	3

D. Data Analytics Methods

Modulnr.	Name des Moduls	Semester	Sprache	ECTS	Seite
CS 667	Computer Vision	HWS	E	6	5

E. Responsible Data Science

Modulnr.	Name des Moduls	Semester	Sprache	ECTS	Seite
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AC 654	Additional Course – Responsible Data Science	HWS/ FSS	E	Max 18	7
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C. Data Management

CS 664	Blockchain Security
Form of module	Inverted classroom with exercises
Type of module	Specialization course
ECTS	6
Workload	Hours per semester present: 56h (4 SWS), Self-study: 112h
Prerequisites	There are no formal prerequisites but knowledge in cryptography and/or IT-security is recommended, e.g., by attending the lectures “Kryptographie I” or “Selected Topics in IT-Security”
Aim of module	Blockchains promise secure and reliable data storage and consensus in a trustless environment. In the light of their growing popularity, Blockchain security becomes increasingly important. The course will equip students with a solid understanding of blockchains, their design principles, underlying technologies and cryptographic primitives. Bitcoin, Monero and Ethereum will be discussed in greater detail and a substantial part of the course will be devoted to security issues and possible attacks.
Learning outcomes and qualification goals	<p>Expertise: Students will acquire profound knowledge of Blockchain technology as well as the skills to critically examine the security of Blockchain-based systems.</p> <p>Methodological competence: Successful participants will be able to understand and evaluate the different ways in which different Blockchain systems try to achieve security. They will also be able to identify where, why and how these security measures are broken for both, current and new systems.</p> <p>Personal competence: The analytic, concentrated, and precise thinking of the students is trained. As multiple different but related Blockchains are discussed, their abstraction capacity is further developed and the transfer of the learned concepts to related questions is trained.</p>
Media	Video recordings, annotated lecture slides
Literature	Will be announced in the lecture

Methods	Reworking the lecture and studying the relevant literature in self-study. During the lecture: discussing questions and ideas and working together on concrete examples. Solving exercises in self-study and in practice in cooperation with fellow students.
Form of assessment	Written exam
Admission requirements for assessment	-
Duration of assessment	90 Minutes
Language	English
Offering	HWS
Lecturer	Prof. Dr. Frederik Armknecht
Person in charge	Prof. Dr. Frederik Armknecht
Duration of Module	1 Semester
Further Modules	-
Range of application	M.Sc. Mannheim Master in Data Science, M.Sc. Wirtschaftsinformatik Lehramt Informatik M.Sc. Mathematik M.Sc. Wirtschaftsmathematik
Semester	1st/2nd/3rd semester

D. Data Analytics Methods

CS 667	Computer Vision
Form of module	Lecture with Exercise
Type of module	Specialization Course
Level	Master
ECTS	6
Workload	Hours per semester present: 56 (4SWS)
Prerequisites	Basis skills in linear algebra, basis knowledge in python, machine learning; no completed exam in Higher Level Computer Vision (CS 646)
Aim of module	<ul style="list-style-type: none"> - CNNs, generative models and RNNs for computer vision - Detection, segmentation etc. - Self-supervised learning - Recent trends, e.g. transformers
Learning outcomes and qualification goals	<p>Expertise:</p> <p>The students have a detailed understanding of modern computer vision techniques based on machine learning. They can understand and evaluate given computer vision algorithms.</p>
	<p>Methodological competence:</p> <p>Students understand the technical basis of computer vision algorithms; they can explain the discussed methods and implement them.</p>
	<p>Personal competence: Understanding complex Computer Vision problems; thorough judgment in the design and use of methods; can work efficiently in a team.</p>
Media	Exercise sheets and lecture slides available online
Literature	<ul style="list-style-type: none"> - Computer Vision: Algorithms and Applications by Richard Szeliski - Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Orville

Methods	Lecture, weekly exercise, book studies, implementation of algorithms, visualization of results
Form of assessment	Written or oral examination (TBA)
Admission requirements for assessment	-
Duration of assessment	90 minutes (Written examination) or 15 minutes (Oral examination)
Language	English
Offering	Fall Semester
Lecturer	Juniorprofessor Dr. Paul Swoboda
Person in charge	Juniorprofessor Dr. Paul Swoboda
Duration of module	1 semester
Further modules	-
Range of application	M. Sc. Wirtschaftsinformatik, M.Sc. Mannheim Master in Data Science, Lehramt Informatik
Semester	1st / 2nd / 3rd semester

E. Responsible Data Science

AC 654	Additional Course – Responsible Data Science
Form of module	Depends on course
Level	Master
ECTS	Max. 18
Workload	Depends on course
Prerequisites	Depends on course
Aim of module	The course falls into the responsible data science area of the MMDS and covers topics related to responsible data science, but is not directly equivalent to any course in the MMDS module catalogue. The course level equals a regular course in MMDS study program. The module can be taken either at the University of Mannheim or at any other university in Germany or abroad.
Learning outcomes and qualification goals	Depends on course
Media / Literature / Methods / Form and duration of assessment	Depends on course
Language	English preferred, but any other language possible if Mannheim faculty member is able to identify content and level
Offering	Spring semester / Fall semester
Lecturer	Lecturer at the host university
Person in charge	Lecturer at the host university
Duration of module	1 Semester
Further modules	-
Range of application	MMDS
Semester	2 nd /3 rd /4 th semester

