

# **Master of Science (M.Sc.)**

## **„Business Informatics“**

University of Mannheim

– Module catalog –  
for students starting before spring 2018

**Appendix**

Academic Year

HWS 2021 / FSS 2022

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

**iii. Business Informatics Specialization courses**

Modulnr.	Name des Moduls	Semester	Sprache	ECTS	Seite
IE 678	Deep Learning	FSS	Englisch	6	3

IE 678	Deep Learning
Form of module	Lecture with exercises
Type of module	Business Informatics Specialization course
Level	Master
ECTS	6
Workload	Hours per semester: 56h (4 SWS)
	Self-study per semester: 98 h <ul style="list-style-type: none"> <li>• 70 h: pre- and post-lecture studying and revision</li> <li>• 28 h: exam preparation</li> </ul>
Prerequisites	IE 675b Machine Learning or equivalent, no exam procedure must have been started in IE 674
Aim of module	<p>Machine learning is concerned with building computer systems that improve with experience as well as the study of learning processes, including the design of algorithms that are able to make predictions or extract knowledge from data. Building upon IE 675b Machine Learning, this course focuses on deep learning and introduces basic and advanced deep learning architectures and techniques, training methods and hyperparameter optimization, as well as selected applications. Tentative topics include:</p> <ul style="list-style-type: none"> <li>• Feedforward neural networks</li> <li>• Training deep learning models</li> <li>• Recurrent neural networks</li> <li>• Convolutional neural networks</li> <li>• Attention and self-attention</li> <li>• Deep learning for graphs</li> <li>• Deep generative modelling</li> <li>• Hyperparameter optimization</li> </ul>
Learning outcomes and qualification goals	Expertise: Deep understanding of fundamental concepts, models, and algorithms of deep learning <div style="text-align: right;">(MK1, MF1)</div>
	Methodological competence: <ul style="list-style-type: none"> <li>• Being able to build and train deep learning models</li> <li>• Being able to select suitable deep learning techniques for a given learning problem</li> </ul> <div style="text-align: right;">(MK2, MF3, MF4)</div>
	Personal competence:

	<ul style="list-style-type: none"> <li>• writing skills</li> <li>• presentation skills</li> <li>• statistical programming skills</li> </ul> <p style="text-align: right;">(MKO3, MF2)</p>
Media	Slide set, exercise sheets, software, datasets
Literature	<ul style="list-style-type: none"> <li>• I. Goodfellow, Y. Bengio, A. Courville. <i>Deep Learning</i>, The MIT Press, 2017</li> <li>• K.P. Murphy. <i>Machine Learning: A Probabilistic Perspective</i>, The MIT Press, 2012</li> <li>• D. Koller, N. Friedman. <i>Probabilistic graphical models</i>. The MIT Press, 2009</li> <li>• Additional material and articles provided in lecture notes</li> </ul>
Methods	The course consists of a lecture accompanied by theoretical and practical exercises as well as case studies with real data. In the exercises, students will deepen the material discussed in the lecture, apply the methods in practice, and present the result.
Form of assessment	Oral examination
Admission requirements for assessment	Homework assignments (pass at least 2 assignments)
Duration of assessment	25 minutes
Language	English
Offering	Spring semester
Lecturer	Prof. Dr. Rainer Gemulla
Person in charge	Prof. Dr. Rainer Gemulla
Duration of module	1 Semester
Further modules	-
Range of application	M.Sc. Wirtschaftsinformatik, M.Sc. Mannheim Master in Data Science
Semester	2 <sup>nd</sup> /3 <sup>rd</sup> semester