

B-IBM 2.5 Data Science und Data Analytics

Code B-IBM 2.5	Workload 125 h	Duration 1 Semester	Workload 42 h physical synchronous contact hours
Level Bachelor	ECTS Credits 5	Frequency both WS and SS	0 h online synchronous contact hours
Module Responsibility Prof. Dr. Daniel Sonnet	Teaching Units 42	Language of Instruction English	25 h guided private study hours 58 h private study hours

Courses

Learning Outcomes/Competencies

The students who have successfully completed the module are able to:

- evaluate large data sets and use the advantages of digital transformation for their professional activities in a targeted manner,
- use open source data analysis software (e.g. Rapid Miner, KNIME, R) in order to structure and combine data from multiple, possibly different, data sources,
- describe prepared data sets using descriptive methods,
- explain the limitations of various modern data analysis methods such as correlation, association rules, cluster analysis, linear regression, neural networks, and decision trees,
- use open source data analysis software (e.g. Rapid Miner, KNIME, R) to predict concrete developments,
- evaluate and organize the implementation of a data analysis project in a business environment and
- communicate the results and effects of a data analysis project in a structured way.

Module Content

The Foundations, History and Philosophy of Data Science

- Structure of databases
- Various database types
- Data types
- Data sources

Description and Analysis of Data using Open Source Data Analysis Software

- Linear regression
- Correlation analysis
- Cluster analysis
- Basket analysis
- Discriminant Analysis
- Decision tree
- Logistic regression
- Neuronal networks

Evaluation of Models

- The analysis focuses on the evaluation of forecasting models. Students will be introduced to various methods for identifying and enhancing the performance of prediction models.

Project Work

- During the project work, students investigate an unknown data set and present the results in a project report and a presentation.

Learning Activities and Teaching Methods

Physical Synchronous Contact Hours:

Lectures and discussion of the completed tasks from the guided self-study in the context of small presentations of results.

Online Synchronous Contact Hours:

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Guided Private Study Hours:

Learning videos as well as the processing of tasks within the scope of project work.

Private Study Hours:

Self-managed preparation and follow-up of courses by working on case studies and exercises, study of literature, preparation of the project report and presentation.

Pre-Requisites

The successful completion of the following modules is recommended:

B-IBM 1.1	International Business and Strategic Management
B-IBM 2.1	Mathematics and Statistics I
B-IBM 2.2	Mathematics and Statistics II
B-IBM 6.2	Academic Writing; Self and Time Management; Presentation Techniques

Assessment Methods and Evaluation Criteria

Students complete this module with a project report (10-15 pages per student) and a presentation (5-10 minutes per student), both of which are completed as group work (maximum 5 members per group). It must be possible to clearly define and assess each student's individual performance on the basis of specified sections, page numbers or other objective criteria. Further details are specified in guidelines provided by the examination office.

The project report contributes 65% to the module grade, the presentation contributes 35%.

A pass in this module is achieved when the overall grade is greater than or equal to 4.0.

Value of Module Grade for Final Grade

5/170 ECTS credit points in Bachelor's degree programs of the integrated system of the faculty of Business & Media according to §1 (2) PO BT.

5/170 ECTS credit points in Bachelor's programs with an internship semester in the integrated system of the faculty of Business & Media according to §1 (2) PO BT.

Literature

Compulsory Literature

Han, J., Pei, J., & Kamber, M. (2011). *Data Mining: Concepts and Techniques* (3rd ed.).

Burlington, MA: Morgan Kaufmann Publishers.

Kelleher, J. D., & Tierney, B. (2018). *Data Science*. Cambridge, MA: The MIT Press.

Provost, F., & Fawcett, T. (2013). *Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking*. Sebastopol, CA: O'Reilly Media.

Further Literature

Cleve, J., & Lämmel, U. (2016). *Data Mining* (2nd ed.).

München: De Gruyter Olden- bourg.

Lantz, B. (2019). *Machine Learning with R: Expert Techniques for Predictive Modeling*

(3rd ed.). Birmingham: Packt Publishing.

Skiena, S. (2017). *The Data Science Design Manual*. Berlin

und Heidelberg: Springer. <https://academy.rapidminer.com/>

<https://www.r-project.org/>