Minor in Data Science

Subject-specific Examination Regulations for a Minor in Data Science (Fachspezifische Prüfungsordnung)

The subject-specific examination regulations for a Minor in Data Science are defined by this program handbook and are valid only in combination with the General Examination Regulations for Undergraduate degree programs (General Examination Regulations = Rahmenprüfungsordnung).

Valid for all students starting their studies in Fall 2026

Version	**Valid as of**	**Decision**	**Details**
Fall 2026 – V1	Sep 01, 2026	May 25, 2022	Originally approved by the Academic Senate

Contents

1 Program Overview

1.1 Concept

1.1.1 The Constructor University Educational Concept

Constructor University aims to educate students for both an academic and a professional career by emphasizing three core objectives: academic excellence, personal development, and employability to succeed in the working world. Constructor University offers excellent research driven education experience across disciplines to prepare students for graduate education as well as career success by combining disciplinary depth and interdisciplinary breadth with supplemental skills education and extra-curricular elements. Through a multi-disciplinary, holistic approach and exposure to cutting-edge technologies and challenges, Constructor University develops and enables the academic excellence, intellectual competences, societal engagement, professional and scientific skills of tomorrows leaders for a sustainable and peaceful future.

In this context, it is Constructor University's aim to educate talented young people from all over the world, regardless of nationality, religion, and material circumstances, to become citizens of the world who are able to take responsible roles for the democratic, peaceful, and sustainable development of the societies in which they live. This is achieved through a high-quality teaching as well as manageable study loads and supportive study conditions. Study programs and related study abroad programs convey academic knowledge as well as the ability to interact positively with other individuals and groups in culturally diverse environments. The ability to succeed in the working world is a core objective for all study programs at Constructor University, both in terms of actual disciplinary subject matter and also to the social skills and intercultural competence. Study-program-specific modules and additional specializations provide the necessary depth, interdisciplinary offerings and the minor option provide breadth while the university-wide general foundation and methods modules, optional German language and Humanities modules, and an extended internship period strengthen the employability of students. The concept of living and learning together on an international campus with many cultural and social activities supplements students' education. In addition, Constructor University offers professional advising and counseling.

Constructor University's educational concept is highly regarded both nationally and internationally. While the university has consistently achieved top marks over the last decade in Germany's most comprehensive and detailed university ranking by the Center for Higher Education (CHE), it has also been listed by one of the most widely observed university rankings, the Times Higher Education (THE) ranking. More details on the current ranking positions can be found at https://constructor.university/more/about-us.

1.1.2 Program Concept

Digitally transforming and data-driven societies reveal novel opportunities and challenges that are only partially acknowledged in disciplinary study programs. The Minor in Data Science at Constructor University puts inter-disciplinarity, diversity, and an internationally shared expert knowledge and understanding into action. Our students obtain a solid foundation in this emerging field, covering both technical and non-technical aspects. With an emphasis on online and asynchronous learning, the Minor

in Data Science is open to students from all Constructor University Bachelor programs allowing for a minor in their curricular structure.

1.2 Specific Advantages of Data Science at Constructor University

The small campus of Constructor University with its broad spectrum of disciplines including Social Sciences, Natural Sciences, Engineering and Computer Science provides ample opportunities for collaborative and interdisciplinary data-driven projects. The Minor in Data Science offers students a natural route to the in-house graduate programs Data Engineering (DE) and Data Science for Society and Business (DSSB). By advancing the cooperation of Constructor University with partners from academia, industry and business, Data Science opens new opportunities for our students.

Asynchronous learning is promoted through online and hybrid module formats in order to manage individual preferences and heterogeneous expertise. Theory and applications are integrated in courses combining lectures with practical tutorials and research projects in order to deepen an understanding through immersion. An innovative teaching approach switches flexibly between these formats and tailor's education towards a personalized experience.

1.3 Program-Specific Educational Aims

1.3.1 Qualification Aims

The Minor in Data Science offers additional interdisciplinary qualification and training in universally applied digital skills for undergraduate students from all majors. Graduates are well prepared to either enter a thriving job market or to successfully pursue their academic studies in many dynamically growing research fields. Particular attention is paid to the following components.

- Societal and legal implications of data science and digitization, business and career opportunities.
- Problem-oriented learning through hands-on computational exercises with Python and other up-to-date software.
- Theoretical background: data operations and analysis pipeline, computer science basics, statistics, and maths.
- Data science applications and case studies from social sciences, natural sciences, and engineering.
- Preparation for life-long digital learning through online/asynchronous module formats.

General qualification follows the Digital Education Plan of the European Union (EU), accelerating the transformation of an open and inclusive higher education in the EU but also beyond https://education.ec.europa.eu/document/digital-education-action-plan.

1.3.2 Intended Learning Outcomes

By the end of the study program, students will be able to:

1. explain societal implications of the digital transformation,
2. understand the legal data protection framework,
3. know the data analysis pipeline and basics of database management,
4. identify important problem types and solution approaches in data analytics,
5. enumerate and describe main Machine Learning (ML) tasks and applications,
6. process ordered data sets such as time series and images,
7. prepare unstructured data sets for processing and analysis,
8. explain matrix decompositions and their usage in data science,
9. apply important ML techniques to classification and regression problems,
10. compose Python scripts and functions to solve data science tasks,
11. apply functions from the libraries NumPy, SciPy, Pandas to data science problems,
12. address Machine Learning tasks by means of the Python library SciKit-learn (sklearn).

1.4 Target Group

The Minor in Data Science is targeted towards students of all areas interested in quantitative scientific analysis, interpretation, and decision-making. There are no explicit prerequisites but a sound foundation in Mathematics is helpful. Full synergy within the minor option for all Bachelor students in all programs, except for those programs excluding a minor track in their curricular structure, or supporting only specific minor subjects (presently IEM, ECE, and RIS).

1.5 More Information and Contact

For more information on the study program please contact the Study Program Coordinator:

Dr. Georgi Dragolov

gdragolov@constructor.university

or visit our program website

Major/Minor combination | Constructor University

For more information on Student Services please visit:

https://constructor.university/student-life/student-services

2 The Curricular Structure

2.1 General

The curricular structure provides multiple elements for enhancing employability, interdisciplinarity, and internationality. The unique CONSTRUCTOR Track, offered across all undergraduate study programs, provides comprehensive tailor-made modules designed to achieve and foster career competency. Additionally, a mandatory internship of at least two months after the second year of study and the possibility to study abroad for one semester give students the opportunity to gain insight into the professional world, apply their intercultural competences and reflect on their roles and ambitions for employment and in a globalized society.

All undergraduate programs at Constructor University are based on a coherently modularized structure, which provides students with an extensive and flexible choice of study plans to meet the educational aims of their major as well as minor study interests and complete their studies within the regular period.

The framework policies and procedures regulating undergraduate study programs at Constructor University can be found on the website (https://constructor.university/student-life/student-services/university-policies).

2.2 The Constructor University 4C Model

Constructor University offers study programs that comply with the regulations of the European Higher Education Area. All study programs are structured according to the European Credit Transfer System (ECTS), which facilitates credit transfer between academic institutions. The three-year under-graduate program involves six semesters of study with a total of 180 ECTS credit points (CP

The undergraduate curricular structure follows an innovative and student-centered modularization scheme - the 4C Model. It groups the disciplinary content of the study program in three overarching themes, CHOICE-CORE-CAREER according to the year of study, while the university-wide CONSTRUCTOR Track is dedicated to multidisciplinary content dedicated to methods as well as intellectual skills and is integrated across all three years of study.

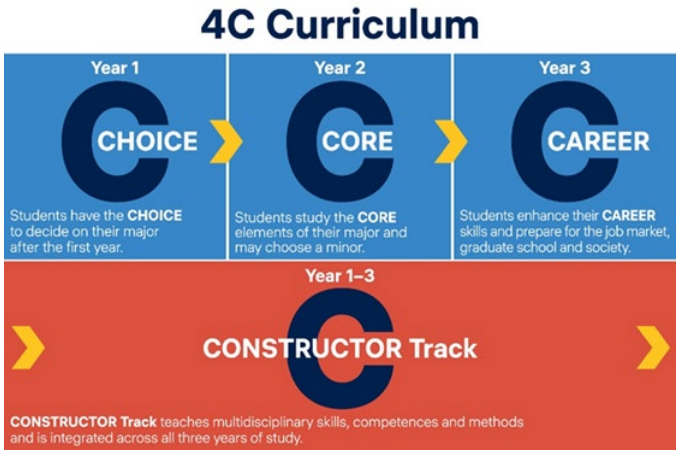

Figure 1: The Constructor University 4C-Model

2.3 Module Requirements for a Minor in Data Science

A minor in Data Science requires 30 CP. The default option to obtain a minor in Data Science is pictured in the schematic study plan in chapter 4. It includes the following CHOICE and CORE modules:

- CHOICE Module: Introduction to Data Science (7.5 CP)
- CHOICE Module: Data Structures and Processing (7.5 CP)
- CORE Module: Data Analytics and Modeling (7.5 CP)
- CORE Module: Applied Machine Learning (7.5 CP)

3 Minor in Data Science Undergraduate Program Regulations

3.1 Scope of these Regulations

The regulations in this handbook are valid for all students who entered their undergraduate studies at Constructor University in Fall 2025. In case of a conflict between the regulations in this handbook and the general Policies for Bachelor Studies, the latter applies (https://constructor.university/student-life/student-services/university-policies).

In exceptional cases, certain necessary deviations from the regulations of this study handbook might occur during the course of study (e.g., change of the semester sequence, assessment type, or the teaching mode of module).

Updates to Study Program Handbooks are based on the policies approved by the Academic Senate on substantial and nonsubstantial changes to study programs. Students are integrated in the decision-making process through their respective committee representatives. All students affected by the changes will be properly informed.

In general, Constructor University reserves therefore the right to change or modify the regulations of the program handbook also after its publication at any time and in its sole discretion.

3.2 Examination Concept

According to the Policies for Bachelor and Master studies, modules generally carry at least five ECTS. Each program ensures appropriate examination frequency and organization, justified in an examination concept and regularly reviewed with student involvement.

Constructor University's examination concept follows the principle of Constructive Alignment (Biggs, 1996), ensuring that learning outcomes, activities, and assessments are consistently aligned: students learn what is intended, and assessments both measure and shape learning. Where one assessment cannot cover all Intended Learning Outcomes (ILOs) complementary forms could be used (e.g., written exams plus lab reports). Module descriptions map ILOs to assessments.

In specific contexts, such as asynchronous online modules or courses emphasizing student engagement, Module Achievements or other types of formative assessments may support competence-oriented assessment.

Student feedback, embedded in the Quality Assurance System (QAS), systematically monitors workload, competence orientation, and alignment of ILOs and assessments. Student surveys and feedback are regulated in the Policy for student surveys and evaluations.

3.3 Degree

After successful completion, the minor in Data Science will be listed on the final transcript under PROGRAM OF STUDY and BA/BSc – [name of the major] as "(Minor: Data Science)."

3.4 Schematic Study Plan for a Minor in Data Science

Figure 2 shows schematically the sequence and types of modules required for the study program.

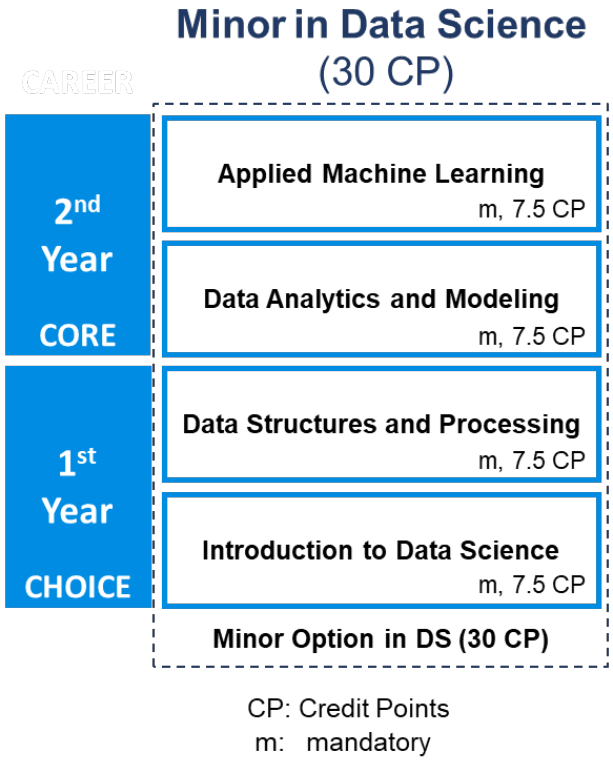

Figure 2: Schematic Study Plan for a Minor in Data Science

Modules

3.4.1 Introduction to Data Science

Module Name	Introduction to Data Science
Module Code	CH-700
Module ECTS	7.5
Program Owner	Minor-Data-Science (Minor in Data Science)
Module Coordinator	Prof. Dr. Hilke Brockmann

Study Semester		
Program	**Semester**	**Status**
F-ACS-BSc Applied Computer Science	1	Mandatory
MDDA-BSc Management, Decisions and Data Analytics	1	Mandatory
Minor-Data-Science Minor in Data Science	1	Mandatory
S-ACS-BSc Applied Computer Science	2	Mandatory

Student Workload	
Asynchronous Self Study	52.5
Interactive Learning	57.5
Exam Preparation	20
Independent Study	57.5
Total Hours	**187.5**

Module Components	**Number**	**Type**	**CP**
Introduction to Data Science	CH-700-A	Lecture (Online)	7.5

Module Description

The module introduces data science with an integrated presentation of three essential components, namely, (1) societal/legal implications and business opportunities, (2) technical/theoretical background and case studies, (3) an introduction to the Python coding environment. The first component entails a conceptual introduction to the opportunities and the challenges of a digitally transformed and data-driven society, presentations on industry standards and legal frameworks, and discussions of critical issues such as cybersecurity and surveillance. The second component includes topics such as data science

terminology, digital data and their representations, and introductions to exploratory data analysis and prominent supervised and unsupervised learning tasks. The third component offers an introduction to the Python ecosystem of data representation, processing, analysis, and visualization, starting with Jupyter notebooks, installing suitable environments, and introductions to data science related packages such as NumPy, SciPy, Matplotlib, Seaborn, and Pandas. Fundamental data science concepts are summarized and illustrated using real-world data from various disciplines. Flexible educational formats (mostly online and hybrid) allow for asynchronous learning. Lectures are combined with an exposure to Python programming and data processing and visualization environments, including hands-on practicals, examples, and exercises.

Intended Learning Outcomes

No	Competence	ILO
1	Explain	Explain societal implications of the digital transformation.
2	Understand	Understand the legal data protection framework.
3	Carry out	Carry out basic data processing and visualization tasks.
4	Apply	Apply fundamental data science methods to structured data.
5	Understand	Understand the logic of Python scripts and functions.
6	Compose	Compose Python code using templates.

Indicative Literature

- Ani Adhikari, John DeNero, David Wagner. Computational and Inferential Thinking: The Foundations of Data Science. 2022. https://inferentialthinking.com/.
- Jake Vanderplas. Python Data Science Handbook. O'Reilly 2016. An online version is available at https://jakevdp.github.io/PythonDataScienceHandbook/.
- Philip D. Brooker. Programing with Python for Social Scientists. Sage 2020.
- Shin Takahasi, Iroha Inoue. The Manga Guide to Linear Algebra. Trend-Pro 2012.
- Shoshana Zuboff. The Age of Surveillance Capitalism. London: Profile 2019.
- Steven S. Skiena. The Data Science Design Manual. Springer 2017.
- The Alan Turing Institute, Data Science for the Social Good.

Entry Requirements

Prerequisites	None
Co-requisites	None
Additional Remarks	None

Assessment and Completion

Module Component	Examination Type	Duration or Length	Weight (%)	Minimum for Pass	ILOs

Introduction to Data Science	Written Examination	180 minutes	100	45%	1-6

Module Completion Requirements

- **Module Examination:** minimum for pass- 45%.

Module Achievement

The module achievement encourages regular engagement with the contents of this online module. It facilitates the acquisition of knowledge on the foundations of the methods and of practical skills for their application. As such, the module achievement systematically prepares the students for the final examination.

The module achievement comprises weekly quizzes. To pass the module achievement, the average result across all quizzes has to be 50 % or higher. It does not impact the overall module grade. Only students who successfully pass the module achievement by the first deadline are eligible to sit for the final examination. Students whose average result across all quizzes is lower than 50 % are given a second opportunity to pass the module achievement and, thereby, sit for the make-up exam.

3.4.2 Data Structures and Processing

Module Name	Data Structures and Processing
Module Code	CH-701
Module ECTS	7.5
Program Owner	Minor-Data-Science (Minor in Data Science)
Module Coordinator	Dr. Georgi Dragolov

Study Semester		
Program	**Semester**	**Status**
MDDA-BSc Management, Decisions and Data Analytics	2	Mandatory
Minor-Data-Science Minor in Data Science	2	Mandatory

Student Workload	
Asynchronous Self Study	52.5
Interactive Learning	57.5
Exam Preparation	20
Independent Study	57.5
Total Hours	**187.5**

Module Components	**Number**	**Type**	**CP**
Data Structures and Processing	CH-701-A	Lecture (Online)	7.5

Module Description

In this module, data structures and the data analysis pipeline are introduced in three parts. The first part gives an overview of the data analysis pipeline from capturing and processing to storing and analyzing data. Database concepts and management as well as the basic distinction between structured and unstructured data are reviewed, including an introduction to the relational data model, supplemented by examples of how specific disciplinary databases are handled. The second part is concerned with different types of structured data, starting with time series and images as examples of ordered data vectors and data matrices, respectively, and addressing both numeric and text data. Particular emphasis will be on tables and their higher-dimensional extensions, allowing for multivariate correlation and regression studies. The third part deals with unstructured data as obtained from web scraping and text mining. Unstructured data need to be prepared for subsequent analyses and use through operations such as merging, ordering, transforming, and resampling. Flexible educational formats (mostly online and hybrid) allow for asynchronous learning. Lectures are combined with Python exercises with particular emphasis on the Pandas package. Disciplinary applications and case studies are immersed as bridging elements.

Recommended Knowledge

Required for solving the coding assignments are Python skills at the level achieved after successful completion of the module Introduction to Data Science.

Intended Learning Outcomes

No	Competence	ILO
1	Enumerate	Enumerate and explain key operations along the data analysis pipeline.
2	Understand	Understand the basics of database management and important data models.
3	Process	Process ordered data sets such as time series and images.
4	Prepare	Prepare unstructured data sets for processing and analysis.
5	Apply	Apply the Pandas package to process and display time series, images, and tables.

Indicative Literature

- Ani Adhikari, John DeNero, David Wagner. Computational and Inferential Thinking: The Foundations of Data Science. Originally developed for the UC Berkeley course Data 8: Foundations of Data Science. An online version of the textbook is available at https://inferentialthinking.com/.
- Jake Vanderplas. Python Data Science Handbook. O'Reilly 2016. An online version is available at https://jakevdp.github.io/PythonDataScienceHandbook/.
- Steven S. Skiena. The Data Science Design Manual. Springer 2017.

Entry Requirements

Prerequisites	None
Co-requisites	None
Additional Remarks	None

Assessment and Completion

Module Component	Examination Type	Duration or Length	Weight (%)	Minimum for Pass	ILOs
Data Structures and Processing	Written Examination	180 min	100	45%	1-6

Module Completion Requirements

- **Module Examination:** minimum for pass- 45%.

Module Achievement

The module achievement encourages regular engagement with the contents of this online module. It facilitates the acquisition of knowledge on the foundations of the methods and of practical skills for their application. As such, the module achievement systematically prepares the students for the final examination. The module achievement comprises weekly quizzes. To pass the module achievement, the average result across all quizzes has to be 50 % or higher. It does not impact the overall module grade. Only students who successfully pass the module achievement by the first deadline are eligible to sit for the final examination. Students whose average result across all quizzes is lower than 50 % are given a second opportunity to pass the module achievement and, thereby, sit for the make-up exam.

3.4.3 Data Analytics and Modeling

Module Name	Data Analytics and Modeling
Module Code	CO-710
Module ECTS	7.5
Program Owner	Minor-Data-Science (Minor in Data Science)
Module Coordinator	Prof. Dr. Joachim Vogt Prof. Dr. Adalbert F.X. Wilhelm

Study Semester		
Program	**Semester**	**Status**
S-ACS-BSc Applied Computer Science	2	Mandatory
F-ACS-BSc Applied Computer Science	3	Mandatory
MDDA-BSc Management, Decisions and Data Analytics	3	Mandatory
Minor-Data-Science Minor in Data Science	3	Mandatory

Student Workload	
Asynchronous Self Study	52.5
Interactive Learning	57.5
Exam Preparation	20
Independent Study	57.5
Total Hours	**187.5**

Module Components	**Number**	**Type**	**CP**
Data Analytics and Modeling	CO-710-A	Lecture (Online)	7.5

Module Description

The module offers an introduction to the principles of data analytics and predictive data modeling and is structured into four parts. First, essential concepts from statistics are reviewed in the data modeling context, illustrating key ideas including randomness, distributions, and confidence regions. Examples and case studies are discussed to distinguish between proper and improper uses of statistics. Basic linear algebra is reviewed in the second part of the module, emphasizing vectors, distances, linear equations, matrices, and inversion. Key ideas such as the least squares approach are motivated with geometrical principles. The third part of the module is concerned with matrix decompositions such as the Singular Value Decomposition (SVD) and its close relatives Principal Component Analysis (PCA) and Empirical

Orthogonal Function (EOF) analysis. The fourth part clarifies the distinction between linear and nonlinear modeling, and introduces key nonlinear techniques. Flexible educational formats (mostly online and hybrid) allow for asynchronous learning. Lectures are combined with Python exercises. Disciplinary applications and case studies are immersed as bridging elements.

Recommended Knowledge

Required for solving the coding assignments are Python skills at the level achieved after successful completion of the module Introduction to Data Science. Furthermore, students are encouraged to review first-year level statistics and linear algebra.

Intended Learning Outcomes

No	Competence	ILO
1	Identify	Identify important problem types and solution approaches in data analytics.
2	Understand	Understand how key concepts from statistics and linear algebra enter data science.
3	Explain	Explain matrix decompositions and their usage in data science.
4	Discuss	Discuss regularization concepts and optimality criteria in data analytics.
5	Know	Know the basics of nonlinear modeling and related computational approaches.
6	Convert	Convert data structures to Python/NumPy arrays for usage in data modeling.
7	Apply	Apply Python statistics and linear algebra tools in data analytics and modeling.

Indicative Literature

- Ani Adhikari, John DeNero, David Wagner. Computational and Inferential Thinking: The Foundations of Data Science 2019. Originally developed for the UC Berkeley course Data 8: Foundations of Data Science. An online version of the textbook is available at https://inferentialthinking.com/.
- Gilbert Strang: Linear Algebra and Learning from Data. Wellesley-Cambridge 2019. See https://math.mit.edu/~gs/learningfromdata/.
- Jake Vanderplas. Python Data Science Handbook. O'Reilly 2016. An online version is available at https://jakevdp.github.io/PythonDataScienceHandbook/.
- Joe Suzuki: Statistical Learning with Math and Python. Springer 2021.
- Steven S. Skiena. The Data Science Design Manual. Springer 2017.

Entry Requirements

Prerequisites	None

Co-requisites	None
Additional Remarks	None

Assessment and Completion

Module Component	Examination Type	Duration or Length	Weight (%)	Minimum for Pass	ILOs
Data Analytics and Modeling	Written Examination	180 minutes	100	45%	1-7

Module Completion Requirements

- **Module Examination:** minimum for pass- 45%.

Module Achievement

The module achievement encourages regular engagement with the contents of this online module. It facilitates the acquisition of knowledge on the foundations of the methods and of practical skills for their application. As such, the module achievement systematically prepares the students for the final examination.

The module achievement comprises weekly quizzes. To pass the module achievement, the average result across all quizzes has to be 50% or higher. It does not impact the overall module grade. Only students who successfully pass the module achievement by the first deadline are eligible to sit for the final examination. Students whose average result across all quizzes is lower than 50% are given a second opportunity to pass the module achievement and, thereby, sit for the make-up exam.

3.4.4 Applied Machine Learning

Module Name	Applied Machine Learning
Module Code	CO-711
Module ECTS	7.5
Program Owner	Minor-Data-Science (Minor in Data Science)
Module Coordinator	Dr. Georgi Dragolov

Study Semester		
Program	**Semester**	**Status**
MDDA-BSc Management, Decisions and Data Analytics	4	Mandatory
Minor-Data-Science Minor in Data Science	4	Mandatory

Student Workload	
Asynchronous Self Study	52.5
Interactive Learning	57.5
Exam Preparation	20
Independent Study	57
Total Hours	**187**

Module Components	**Number**	**Type**	**CP**
Applied Machine Learning	CO-711-A	Lecture (Online)	7.5

Module Description

The module provides a hands-on introduction to Machine Learning (ML), emphasizing practical aspects of workflows and applications. Topics include k-Means clustering, Nearest Neighbor (NN) and Naive Bayes techniques, Decision Trees, Support Vector Machines (SVMs). Particular emphasis is on Neural Networks and Deep Learning. Theoretical concepts such as distance metrics, graphs, and networks are reviewed. Flexible educational formats (mostly online and hybrid) allow for asynchronous learning. Lectures are combined with Python exercises with particular emphasis on the scitkit-learn package. Disciplinary applications and case studies are immersed as bridging elements

Recommended Knowledge

Required for solving the coding assignments are Python skills at the level achieved after successful completion of the module Introduction to Data Science. Furthermore, students are encouraged to review first-year level statistics and linear algebra.

Intended Learning Outcomes

No	Competence	ILO
1	Enumerate	Enumerate and describe main Machine Learning (ML) tasks and applications.
2	Discern	Discern and explain important ML approaches to classification and regression.
3	Apply	Apply Nearest Neighbor and Naive Bayes techniques to classification problems.
4	Employ	Employ Decision Trees and Support Vector Machines to solve data science problems.
5	Understand	Understand and use Neural Network and Deep Learning techniques.
6	Address	Address Machine Learning tasks by means of the Python library SciKit-learn (sklearn).

Indicative Literature

- Jake Vanderplas. Python Data Science Handbook. O'Reilly 2016. An online version is available at https://jakevdp.github.io/PythonDataScienceHandbook/.
- Joe Suzuki: Statistical Learning with Math and Python. Springer 2021.
- Steven S. Skiena. The Data Science Design Manual. Springer, 2017.

Entry Requirements

Prerequisites	None
Co-requisites	None
Additional Remarks	None

Assessment and Completion

Module Component	Examination Type	Duration or Length	Weight (%)	Minimum for Pass	ILOs
Applied Machine Learning	Written Examination	180 min	100	45%	1-6

Module Completion Requirements

- **Module Examination:** minimum for pass- 45%.

Module Achievement

None

4 Appendix

4.1 Intended Learning Outcomes Assessment-Matrix

Minor in Data Science					Introduction to Data Science	Data Structures and Processing	Data Analytics and Modeling	Applied Machine Learning
Semester					1	2	3	4
Mandatory (m) for a Minor in Data Science					m	m	m	m
Credits					7.5	7.5	7.5	7.5
	Competencies*							
Program Learning Outcomes	**A**	**E**	**P**	**S**				
Explain societal implications of the digital transformation	x	x	x		x			
Understand the legal data protection framework	x	x			x			
Know the data analysis pipeline and basics of database management	x	x	x	x	x	x	x	x
Identify important problem types and solution approaches in data analytics	x	x			x		x	x
enumerate and describe main Machine Learning (ML) tasks and applications	x	x			x		x	x
Process ordered data sets such as time series and images	x	x				x		
Prepare unstructured data sets for processing and analysis	x					x		
Explain matrix decompositions and their usage in data science	x						x	
Apply important ML techniques to classification and regression problems	x	x	x	x	x		x	x
Compose Python scripts and functions to solve data science tasks	x	x	x		x	x	x	x
Apply functions from the libraries NumPy, SciPy, Pandas to data science problems	x	x	x				x	
Address Machine Learning tasks by means of the Python library SciKit-learn (sklearn)	x	x	x	x				x
Assessment Type								
Oral examination								
Written examination					x	x	x	x
Project								
Term papaer, essay								
(Lab) Report								
Poster presentation								
Presentation								
Thesis								
Various								
Module achievements/bonus achievements					x	x	x	x

*Competencies: A-scientific/academic proficiency; E-competence for qualified employment; P-development of personality; S-competence for engagement in society

Figure 3: Intended Learning Outcome Assessment Matrix