



**Exponential  
University**  
of applied sciences

# Short Module Manual **Data Science (M.Sc.)**

XU Exponential University  
of Applied Science

## SHORT FACTS

<b>Graduation</b>	Master of Science	<b>Type of Study</b>	Full-time
<b>Scope</b>	120 ECTS	<b>Total numbers of semesters</b>	4 semesters
<b>Language</b>	English	<b>Matriculation Date</b>	April / October

**Teaching method**    Seminars in small groups, additional excursions, case studies, integration into practice, Projects

## Course and content of studies

### SEMESTER 1

**MDS 1    Data Science Operations    5 ECTS**  
written exam

- **Data Science Business Operations :** History and fundamentals of Data Science, basic terminology, structure of Data Science projects
- **Data Science Process Operations :** Definition of processes in Data Science projects, tools and methods for different process steps

**MDS 2    Descriptive Analytics    5 ECTS**  
oral exam

- **Integrated Data Collection and Preparation :** Introduction to integrated data acquisition and data preparation
- **Automated Data Evaluation and Presentation :** Introduction to the basics of evaluation, data prediction and data visualization

**MDS 3    Parallel Computing    5 ECTS**  
term paper

- **Parallel and Distributed Systems/Computer Architectures and Models :** Fundamentals, principles, algorithms and systems of parallel processing
- **Parallel and Distributed Programming/Concepts and Practices (Lab) :** Application of principles, algorithms and system of parallel processing

**MSK 4    Leadership Assessment I (Pre - Test)    5 ECTS**  
term paper

- **Leadership Assessment :** Analysis of personal leadership characteristics and leadership style based on leadership tests, identification and planning of individual development and learning tasks





## SEMESTER 1

MSK 1

**Leadership Skills**

**5 ECTS**

term paper

- **Digital Leadership** : Fundamentals of digital leadership, factors influencing digital leadership, management methods in the digital transformation, new leadership approaches to digital leadership
- **Emotional Leadership** : Fundamentals and basic concepts of Emotional Leadership, prerequisites for Emotional Leadership, developing leaders with Emotional Intelligence, building companies/departments/teams and organizations with Emotional Intelligence

### ELECTIVE MODULES 1 OF 3

MEL 22

**Information Retrieval**

**5 ECTS**

written exam

- **Introduction Information Retrieval** : Definition and models of information retrieval, architecture of information retrieval systems
- **Introduction Natural Language Processing** : Basics, prerequisites and functionality of Natural Language Processing

MEL 25

**Marketing Analytics**

**5 ECTS**

written paper

- **Marketing Strategy - Market Segmentation, Competitor and Customer Analytics** : Fundamentals and current developments of digital marketing, phases and central tasks of market segmentation, significance and content of strategic marketing
- **Marketing Delivery - Product, Price, Promotion and Distribution Analytics**: Strategy development through product and strengths/weaknesses analysis, determine various price analysis models

MEL 28

**Language Modeling and Processing**

**5 ECTS**

term paper

- **Natural Language Modeling** : statistical approaches to modeling structures in phonology, morphology, syntax and lexical semantics, most important symbolic and statistical models
- **Natural Language Processing** : Basics, prerequisites and functionality of Natural Language Processing, requirements for software

## SEMESTER 2

MDS 4

**Data Science Applications**

**5 ECTS**

written exam

- **Professional Programming Languages** : Concepts of selected programming languages, meaning of program elements and semantics, basic languages, complex data structures
- **Professional Programming Techniques** : Practical application, deepening and expansion of competencies



**SEMESTER 2**

**MDS 5 Predictive Analytics**

**5 ECTS**

termpaper

- **Predictive Models and Business Applications** : Historical background and significance of predictive models and business applications in the context of digitalization and current developments, consideration of ethical aspects in the analysis and interpretation of data, differentiation of data transformations for single predictors and data transformations for multiple predictors as well as essential feature definition
- **Predictive Modeling/Analytical Techniques** : Data preparation for predictive modeling, summarizing and visualizing data sets, data processing steps. Concepts for classification, classification models

**MDS 6 Cognitive Computing**

**5 ECTS**

Presentation

- **Advanced Machine Learning** : Statistical theory of machine learning, Analysis and evaluation of statistical models, Ethical aspects in the use of Machine. Learning and digitized processes, basic reinforcement learning, basic semi-supervised learning.
- **Programming Machine Learning (Lab)** : Programming project in team

**MSK 2 Research Skills**

**5 ECTS**

Presentation

- **Quantitative Research Methods** : Basic concepts, principles and methods of quantitative research, research process, data collection and analysis, applied quantitative research
- **Qualitative Research Methods** : Basic concepts, principles and methods of quantitative research, research process, data collection and analysis, applied quantitative research

**ELECTIVE MODULES 1 OF 3**

**MEL 23 Information Retrieval Models**

**5 ECTS**

oral exam

- **Information Retrieval Models** : Theoretical concepts in advanced information retrieval, models of information retrieval and their differences, similarity and matching strategies
- **Retrieval Measures** : Information retrieval measures, laws and algorithms, effectiveness of search queries through various search measures



**SEMESTER 2**

**MEL 26 Financial Analytics**

**5 ECTS**

written exam

- **Financial Statement Analytics – Profitability, Liquidity and Cash Flow Analytics :** Importance of selected financial analyses and their instruments, creation of trend lines, valuation theory and its concepts
- **Financial Investment Analytics – Performance, Portfolio and Risk Analytics :** Key factors in investment analysis, identification and evaluation of investments, back testing of investment strategies, portfolio management strategy, fundamental and technical analysis

**MEL 29 Language Resources and Processes**

**5 ECTS**

term paper

- **Computer Linguistic Resources :** History of computational linguistics, extraction of information from texts, components of computational linguistics
- **Computer Linguistic Processes :** Application areas of computational linguistics, automatic translation, automated processing, interaction with a user in the context of a dialog system

**MIN 1 International Summer School**

**5 ECTS**

depends on partnerschool

Students take a 2–3 week course at a university abroad. Content is specified by the partner university

**SEMESTER 3**

**MDS 7 Data Science Innovations**

**5 ECTS**

Presentation

- **Embedded Analytics :** Analyses, recommendations for action and areas of application and possible uses of prescriptive analytics, prescriptive analytics software, categories of models and modeling techniques, construction and implementation of simulation models
- **Distributed Analytics :** Distributed computing in the context of Big Data analytics, developing a distributed data analytics program, asset optimization through improved, proactive and highly automated management of infrastructure, resources and capital.

**MDS 8 Prescriptive Analytics**

**5 ECTS**

oral exam

- **Prescriptive Tools and Business Solutions :** Analyses, recommendations for action and areas of application and possible uses of prescriptive analytics, prescriptive analytics software, categories of models and modeling techniques, construction and implementation of simulation models
- **Prescriptive Action Planning/Analytical Techniques :** Selected case studies on prescriptive analytics, performing prescriptive analytics on a case study using software of your own choosing

**MDS 8 Disruptive Computing**

**5 ECTS**

written exam

- **Disruptive Models and Tools** : Characteristics of disruptive technologies, examples of disruptive models, characteristics of cloud computing, security risks and compliance issues of the cloud, encryption and decentralization at the heart of blockchain technology
- **Disruptive Methods and Techniques (Lab)** : Independent group project on selected case study

**MSK 3 Consulting Skills**

**5 ECTS**

Case study

- **Digitization Consulting** : Fundamentals and development of consulting, concepts of external and internal management consulting and the associated consulting roles, consulting concepts and roles in the context of digitization processes in the company, phases of the consulting process, principle of lean consulting
- **Digitization Consulting Project** : Building on the previous modules, students design a consultancy in companies as part of a digital transformation project on selected focal points

**MSK 6 Company/Research Project**

**5 ECTS**

term paper

- **Company/Research Project** : independently develop, formulate and justify a differentiated scientific research question within the framework of a practical project, independently develop approaches to solutions for the developed question, apply quantitative and qualitative research methods and take into account scientific requirements for investigations and surveys

**ELECTIVE MODULES 1 OF 3**

**MEL 24 Multilingual Information Retrieval**

**5 ECTS**

term paper

- **Multilingual Information Systems** : Terminology of multilingual information systems, current research challenges, implementation of an in-language information retrieval system, information search and user interaction, user information needs and search tasks, support for multilingual user interaction
- **Multilingual Information Retrieval** : system-oriented evaluation for multilingual information retrieval systems, user-oriented evaluation evaluation for multilingual information retrieval systems, multilingual information access applications





**SEMESTER 3**

**MEL 27 HR Analytics**

**5 ECTS**

Presentation

- **Talent Sourcing – Talent Recruitment and Selection Analytics** : new, digital technologies for recruiting and HR processes, e-sourcing, sourcing channels, data-driven people analytics tools, talent sourcing
- **Talent Coaching – Talent Engagement and Retention Analytics** : Employee analytics metrics, HR data analytics, attrition rate as a component of talent analytics, corporate culture as a key to retaining employees

**MEL 30 Language Processing Practices**

**5 ECTS**

oral exam

- **Natural Language Processing APIs** : importance of well-documented programming interfaces, type classes and functionalities of APIs
- **Natural Language Processing Lab** : Develop a user-friendly, automated system

**MT 2 Master Thesis Set-up**

**5 ECTS**

oral exam

- **Master Thesis Colloquium** : Independent development and answering of a larger scientific question, development of new knowledge in a subject area in a limited time and scientific adequate presentation
- **Master Thesis Reflection/Coaching** : Professional support from the exposé and structuring of the paper to the outline and systematic treatment of the topic, support in the implementation of empirical questions and the development of own lines of argumentation, advice on the observance of scientific formalities

**SEMESTER 4**

**MT 1 Master Thesis**

**20 ECTS**

Master Thesis

**MSK 5 Leadership Assessment II (Post-Test)**

**5 ECTS**

Presentation

**IN TOTAL :**

**120 ECTS**

