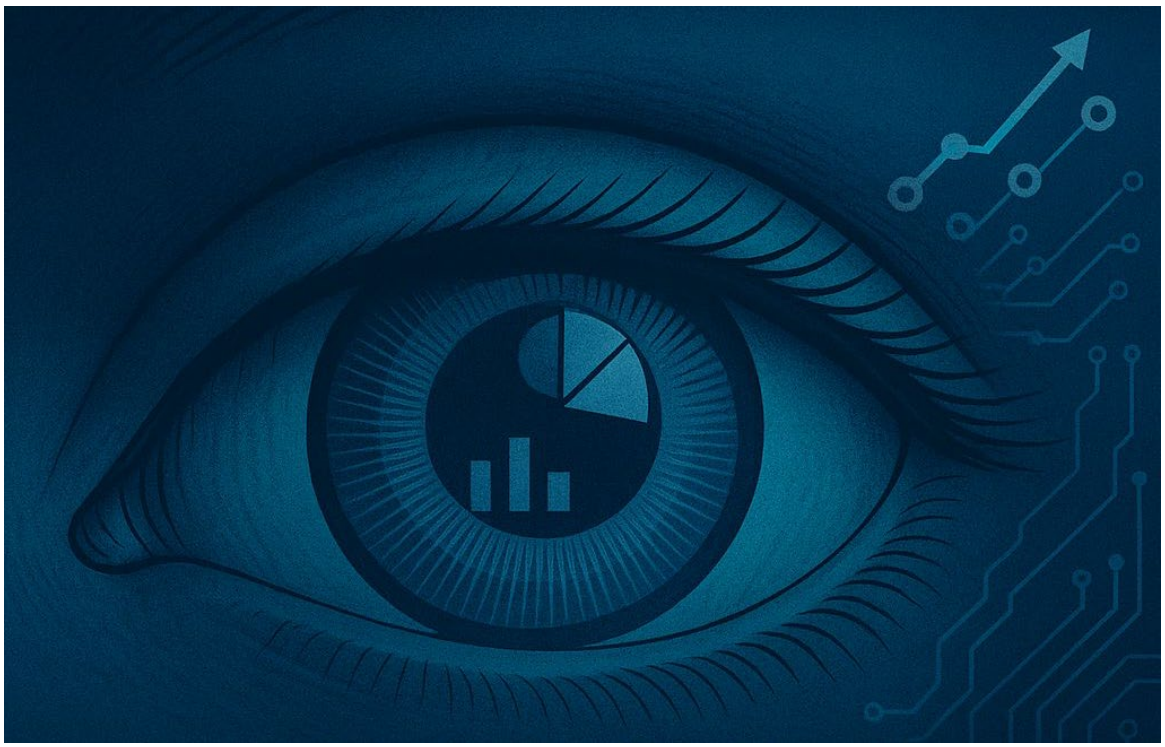
University of Applied Sciences

HOCHSCHULE EMDEN·LEER

Module Handbook

Master's Study Program Business Informatics (M.Sc.)



University of Applied Sciences Emden/Leer
Faculty of Technology
Department Mechanical Engineering

Table of Contents:

Overview

Faculty	Technology
Division	Mechanical Engineering
Degree	Master of Science (M.Sc.)
Standard period of study	3 Semester full time (FT); 5 Semester part time (PT)
Total Workload	90 ECTS

Introduction

The Master's program in Business Informatics uniquely combines the core competencies of computer science with the strategic and operational knowledge of economics. It is aimed at students who work at the interface between technology and management and want to design complex digital systems, data-driven business models, and innovative solutions in organizations. The program teaches both in-depth scientific fundamentals and practical methods for analyzing technical developments, evaluating them economically, and implementing them professionally in companies.

The curriculum is based on three complementary pillars that together create a comprehensive skill set for future specialists and managers in the field of digital transformation:

1. Technical modules

The technical modules form the foundation on the computer science side. They provide in-depth knowledge in areas such as software development, databases, information system architectures, artificial intelligence, and IT security. Students learn to evaluate modern technologies, design complex systems, and develop digital solutions for real-world business problems. Application-oriented teaching formats and project-based work strengthen the ability to critically assess technological innovations and use them effectively.

2. Professionalization area

The professionalization area promotes the methodological, communicative, and analytical skills that are indispensable for professional roles in IT management and interdisciplinary projects. These include scientific work, project and process management, presentation and teamwork skills, and the deepening of individual areas of focus. This area supports students in working on complex tasks independently, in a structured and goal-oriented manner – both in an academic context and in business practice.

3. Business modules

The business modules impart the necessary business and strategic knowledge to place technological decisions in an overall economic context. The focus is on corporate management, controlling, digital value creation, innovation management, and strategic development, among other topics. Students learn to evaluate technological opportunities and risks economically and to make informed decisions based on business management methods.

The Master's program in Business Informatics thus comprehensively qualifies graduates for demanding tasks in areas such as IT management, consulting, system architecture, data analysis, and innovation and process management. The targeted combination of technology, professionalization, and economics creates a study concept that optimally prepares students for the requirements of the digital working world.

Module overview

Business Informatics

Master Modul			
Master Thesis with Colloquium	28 ECTS		3. Sem.
Introduction to Scientific Working	2 ECTS	30 ECTS	

Technical Module		Professionalization		Business Module		
● Software Development 5 ECTS	○ Technical Module 5 ECTS	● Introduction to Data Sciences 5 ECTS	○ Professionalization Module 5 ECTS	● Business Administration 5 ECTS	○ Business Module 5 ECTS	2./1. Sem. 30 ECTS
● Smart Grids 5 ECTS	○ Technical Module 5 ECTS	● AI Ethics & Digital Governance 5 ECTS	○ Professionalization Module 5 ECTS	● Marketing 5 ECTS	○ Business Module 5 ECTS	1./2. Sem. 30 ECTS

Legende: ● Pflichtmodul ○ Wahlpflichtmodul

○ **Technical Module**	○ **Professionalization**	○ **Business Module**
Business Analytics Machine Learning Data Management IT Security Project T Current Topic T	Advanced Project Management Sustainable Innovation Management Quality Management Leadership & Negotiation	Controlling ERP-Systems Business and IT Law Business Process Management Project B Current Topic B

General Definitions

Each module of the Business Informatics program is based on the following standards:

- The program is taught fully in English
- Each module lasts one semester (6 months)
- Students receive 5 ECTS credits for each successfully completed module
- Courses take place every semester. The modules are offered annually during the winter or summer semester.
- By taking elective modules, students can develop their own individual focus and specialization. The compulsory modules are worth 30 credit points (ECTS). The elective modules are worth 30 credit points (ECTS). In addition, there is the master's thesis with colloquium, which is worth 30 credit points. One credit point corresponds to 30 hours of work by the student.
- Extracurricular elective modules are offered as needed. This is coordinated before the start of the semester. If an elective course is chosen by more than 60% of students, it will be offered additionally.
- The modules from the first and second semesters do not build on each other in terms of content, so that it is possible to start the program in either the summer or winter semester. The modules from the first semester are offered in the summer semester, and the modules from the second semester are offered in the winter semester. Students who begin their studies in the summer semester will initially attend the courses from the first semester. In the following semester, they will attend the courses from the second semester. For students who begin their studies in the winter semester, the order is reversed.

Abbreviations

Abbreviations and forms of examination

(DV)	creation and documentation of computer programs
(K) (#)	written exam (processing time in time hours)
(M)	oral examination
(P)	project report
(R)	presentation
(H)	report
(PO)	portfolio exam
(SWS)	semester hours per week
(S)	Master thesis with Colloquium

According to the General Part of the Master Examination Regulations (Part A)

2. Mandatory Modules

2.1 Software Development *(Winter semester)*

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Lecture, group work, exercises
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project report (P)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students know the basic concepts of software development and can categorise and evaluate their own development processes with regard to the various phases and methods. In addition, they will be able to understand and apply the various software technologies and architectures. Future software developers will be able to implement and evaluate complex software projects using a general method as well as specific instruments and tools.

Content

Basics of software development, role of the software developer. Software development processes, basics of software architecture, introduction to the Python programming language (syntax, semantics, object-oriented programming), software quality, basics of software testing, test types, test methods, test tools, introduction to agility and Scrum, roles, artefacts, processes, software development in a team (teamwork, communication, conflict resolution, roles and responsibilities), requirements and restrictions in an industrial environment, software development in a production environment.

Literature

- Helmut Balzert: Lehrbuch der Softwaretechnik: Basiskonzepte und Requirements Engineering, 3. Edition, Spektrum Akademischer Verlag Heidelberg, 2009
- Helmut Balzert: Lehrbuch der Softwaretechnik: Entwurf, Implementierung, Installation und Betrieb, 3. Edition, Spektrum Akademischer Verlag Heidelberg, 2011
- Helmut Balzert: Lehrbuch der Softwaretechnik: Softwaremanagement, 2. Edition, Spektrum Akademischer Verlag Heidelberg, 2008
- Helmut Balzert, Christof Ebert: Lehrbuch der Softwaretechnik, Springer Verlag, 2026
- Michaela Kauer-Franz, Benjamin Franz: Usability und User Experience Design – Das umfassende Handbuch, Rheinwerk Verlag, 2022ature

Course

Lecturer	Title	SWS
Prof. Dr. Elmar Wings	Software Development	2
Prof. Dr. Elmar Wings	Software Development – Exercises	2

2.2 Introduction to Data Sciences *(Summer semester)*

Lecturer in charge:	Prof. Dr. Joachim Schwarz
Form:	Lectures combined with exercises
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

Data Science is an interdisciplinary subject that brings together the fields of computer science, statistics and the respective application area. After this course, students understand how all three areas are equally considered. Students know the essential components of data analysis and their tasks. They are familiar with and can illustrate and apply the basic algorithms and methods. Thus, they develop a deeper understanding of the interrelationships and learn how essential tools and algorithms of data analysis can be applied in business settings.

Content

The course includes an introduction to R and its ecosystem. The basics of descriptive and inferential statistics, including an introduction in probability theory and the normal distribution, are developed and applied in Data Science. Furthermore, different algorithms and procedures from the field of data science and their application areas are presented. In detail this course contains:

- Data Science basics including an introduction to R
- Univariate and bivariate descriptive statistics
- Probability theory and the normal distribution
- Inferential statistics basics: Point estimation, confidence intervals and hypothesis testing
- Data preprocessing and data cleaning
- Linear regression
- Methods for classification, e.g. logistic regression, neural networks, decision trees
- Methods for segmentation, e.g. cluster analysis
- Methods for dimension reduction, e.g. principal component analysis
- Text mining (optional).

Literature

- Backhaus, K.; Erichson, B.; Plinke, W.; Weiber, R.: Multivariate Analysis, Berlin.
- Field, A.; Miles, J.; Field, Z.: Discovering Statistics Using R, London.
- Gujarati, D. N.; Porter, D. C.: Basic Econometrics, Boston, MA.
- Hosmer, D. W.; Lemeshow, S.: Applied Logistic Regression, New York.
- James, G.; Witten, D.; Hastie, T.; Tibshirani, R.: An Introduction to Statistical Learning with Applications in R, New York, NY.
- Kutner, M. H.; Nachtsheim, C. J.; Neter, J.; Li, W.: Applied Linear Statistical Models, Boston.
- Kwartler, T.: Text Mining in Practice with R, Oxford.
- Menard, S.: Logistic Regression: From Introductory to Advanced Concepts and Applications, Thousand Oaks.
- Silge, J.; Robinson, D.: Text Mining with R - A Tidy Approach, Boston, MA.

Course

Lecturer	Title	SWS
Prof. Dr. Joachim Schwarz	Introduction to Data Sciences	4

2.3 Business Administration *(Winter semester)*

Lecturer in charge:	Prof. Dr. Monika Blattmeier
Form:	Lecture
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students develop their research and practical skills in order to design value creation processes based on the fundamentals of business administration and project management.

Content

The contents of the module follow the individual business functions:

- Strategic management
- Primary functions: marketing, sales, materials management, finance
- Support functions: Internal and external accounting, human resource management, knowledge management

In addition, there is an in-depth look at the basics of project management and the design of practical examples. Finally, teaching and learning methods are supported by the pattern approach and visual learning.

Literature

Straub, Thomas: Einführung in die Allgemeine Betriebswirtschaftslehre, Pearson, 2015.
Gonschorek. Torsten: Betriebswirtschaftslehre für Ingenieure. Carl Hanser Verlag, 2022.
Meissner, Jens O.; Heike, Michael; Sigrist, Daniel: Organizational Design in a Complex and Unstable World. Springer, 2024.

Course

Lecturer	Title	SWS
Prof. Dr. Monika Blattmeier	Business Administration	4

2.4 Smart Grids *(Summer semester)*

Lecturer in charge:	Dr. Sandro Günter
Form:	Lecture, group work, exercises
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students:

- understand the key drivers for the transition towards Smart Grids
- are able to explain the architecture of Smart Grids
- are familiar with the power electronics and its application in renewable energy resources
- are able to analyse different Smart Grid projects
- are familiar with the types of communication used in Smart Grids
- know the concepts of energy management and can give examples
- can build models for Smart Grids and analyse different scenarios

Content

- Fundamentals of Smart Grids
- Introduction to Power Electronics and Renewable Energies
- Smart Grid Architectures
- IoT and Data in Smart Grids
- Energy Management
- Energy Storage Integration
- Modelling and Digital Twins
- Social and economic significance

Literature

Further literature will be announced in the first lecture

Course

Lecturer	Title	SWS
Dr. Sandro Günter	Smart Grids	2
	Smart Grids – Exercises	2

2.5 AI Ethics & Digital Governance *(Summer semester)*

Lecturer in charger:	Dr. Jumoke Oladejo
Form:	Lecture, group work
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project report (P)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students examine ethical, legal, and governance frameworks for AI and digital systems in engineering. The module explores accountability, transparency, and risk management under regulations like the EU AI Act
Identify ethical and regulatory challenges in AI and digitalization.

- Apply governance frameworks (EU AI Act, OECD, IEEE) to engineering cases.
- Evaluate business model implications of digital technologies.
- Assess ethical trade-offs in automation and data use.
- Communicate governance recommendations clearly and persuasively.

Content

- AI ethics frameworks (EU AI Act, IEEE, OECD).
- Case studies in automation, predictive maintenance, smart grids.
- Governance and accountability frameworks.
- Responsible innovation in practice.

Literature

- Boddington, P. (2023). AI Ethics: A Textbook. Springer.
- IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems (2019). Ethically Aligned Design: A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems.
- Ethics of Artificial Intelligence: Case Studies and Options for Addressing Ethical Challenges. Springer Briefs in Research and Innovation Governance.

Course

Lecturer	Title	SWS
Dr. Jumoke Oladejo	Ethics	4

2.6 Marketing *(Summer semester)*

Lecturer in charge:	Dr. Diederich Bakker
Form:	Lecture, exercise class
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

The students have a critical understanding of the most important theories, principles and methods of modern marketing and are able to identify, assess and solve issues with relevance to Marketing in unknown and complex contexts. To this end, they know how to use basic marketing tools such as the Ansoff matrix or the BCG product portfolio model. The underlying knowledge reflects the state-of-the-art in literature and research, and delves into selected fields of expertise. The students are able to critically discuss Marketing issues and to expand their knowledge base independently.

Content

The course is designed to be taught for students who usually have a technical and scientific bachelor's degree. For this reason, in addition to the teaching of general concepts, there is a consistent focus on business customer and industrial goods markets. The course will be held in English.

At the beginning, the role of marketing within a company is clarified as well as the importance of focusing all company activities on customers. Subsequently, purchasing behavior in the B2B (Business-to-Business) sector is explicitly considered. Principles and methods of market research are also discussed, with particular reference to modern methods of data collection and analysis. The basics of strategic marketing planning are conveyed as the guiding principles of the company's activities. This leads to a detailed examination of the elements of the marketing mix", i. e. the product, price, distribution and communication policy, each with selected special features for dealing with industrial markets.

Product policy is based on the concept of the product life cycle and also deals with innovation and product modification processes as well as the management of brands and product ranges. Pricing policy focuses on cost-, demand-, and competition-oriented pricing methods as well as price management over time. In communication policy, the entire set of classical and modern communication instruments is considered, while in distribution policy all alternatives of direct and indirect distribution channels are dealt with. The concept of the customer journey integrates both.

All contents are being illustrated by using up-to-date examples from both consumer and industrial goods markets. Exercises and short case studies allow for an application of learned contents to real life scenarios. At the end of the semester, a use-case supported introduction to a CRM system takes place in order to let the students experience structures and possibilities of such standard software in the company.

Literature

- Jobber, David: Principles and Practice of Marketing. McGrawHill, latest edition.

Course

Lecturer	Title	SWS
Dr. Diederich Bakker	Marketing	4

2.7 Master Thesis with Colloquium & Introduction to Scientific Working

Lecturer in charge:	Professors / Lecturer of the study program
Form:	Independent work on a larger program.
Type:	Mandatory module
Contact-Time (h):	90
Self-Study-Time (h):	810
Exam:	Scientific report and oral presentation Master's thesis and colloquium (S)
ECTS:	30

Competences

Students are able to work on a given problem. They can independently explore the current scientific literature and draw conclusions.
In doing so, they apply the knowledge they have acquired and develop goal-oriented solutions as part of their master's thesis. They have in-depth knowledge of project management and can apply this knowledge appropriately in scientific projects.

Content

Current topics in the field of business informatics.

- In-depth study of a technical focus
- Independent in-depth study of a topic, in particular with the help of technical/scientific literature
- Preparation of presentations and scientific papers with the aim of scientific publication.

Literature

- Guide to Writing a Seminar Paper; Gök, Robert
- Task-related literature

Course

Lecturer	Title	SWS
Prof. Dr. Kathrin Ottink	Introduction to Scientific Working	2
Professors/Lecturer of study program	Master Thesis and Colloquium	28

3. Mandatory Elective Modules

3.1 Business Analytics *(Summer semester)*

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Seminaristischer Unterricht, Serious Gaming, Teamarbeit
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Presentation (R)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA

Competences

Students gain the understanding and competence of how available internal and external company data can be analyzed in such a way that concrete entrepreneurial problems can be considered in an evidence-based manner and then solved. Business analytics is considered applied data science in business administration. Process-related questions, organizational internal interrelationships, etc. can be analyzed with the help of this discipline. The students learn four central phases "framing", "allocating", "analytics" and "preparation" and the respective methods to be able to process the phases. In their own case study, the students apply the theoretical knowledge and are guided to train intensively how they can also deal with ethical challenges of the discipline in the corporate context.

Content

- 4 BA phases (according to Seiter) "Framing", "Allocating", "Analytics", "Preparation", incl. associated methods
- Project and team management (e.g. agility, communication)
- Visualization of results
- Storytelling of results
- Linking data analytics with the mission, vision, strategy and goals of companies
- Dealing with Big Data (VVVV)
- The increased use of analytical models for the automated control of entire operational processes
- Transferring decisions from people to systems: (1) Purely digital processes, (2) Semi physically digitized processes, (3) Fully digitally controlled physical processes.
- Challenge by aspects of Disruption / within the Professional Field of Data Scientists
- Critical discussion and reflection - opportunities, limits, data and privacy protection (DSGVO & differences to selected national jurisdictions)

Literature

- Seiter, Mischa: Business Analytics. Wie Sie Daten für die Steuerung von Unternehmen nutzen (2019)
- Weber, Felix: Künstliche Intelligenz für Business Analytics. Algorithmen, Plattformen und Anwendungsszenarien (2020)
- Martini, Mario: Blackbox Algorithmus – Grundfragen einer Regulierung Künstlicher Intelligenz (2019)
- Oppl, Stefan; Stary, Christian: Designing Digital WorkConcepts and Methods for Human-centered Digitization (2019)

Course

Lecturer	Title	SWS
Prof. Dr. Elmar Wings	Business Analytics	4

3.2 Machine Learning *(Winter semester)*

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Lectures and exercises
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MBIDA

Competences

Machine learning refers to methods and tools that enable computers to make decisions without being explicitly programmed. In the last decade, the field of machine learning has made great progress, especially in areas such as natural language processing and computer vision. This course covers basic (e.g. linear models, tree-based models) and advanced (e.g. deep neural networks) methods of supervised machine learning and their application in various business contexts.

Students know and understand important basic principles and methods of symbolic Artificial Intelligence, especially knowledge representation, planning and inference. They are able to analyze procedures, approaches, ethical and technical risks, and limitations of intelligent systems and are able to develop and evaluate solutions for typical AI problems. Students are able to develop applications for Classifications and prognosis models using machine learning methods and to use them within their area of competence.

They can work on smaller problems both independently and in teams. They present their work in lectures and have to justify their choice of methods.

Content

In this module the following topics are covered:

- basic concepts: knowledge discovery in databases process, machine learning, exploratory data analysis, preparation of data sets, validation models, generalization
- linear and generalized regression models, logistic regression
- classic machine learning models: Bayesklassifikatoren, next-neighbour methods, decision trees, random forest trees, support vector machines
- model evaluation and selection
- neural networks, deep learning, convolutional neural networks for image processing tasks
- long short term memory for automatic language recognition and translation

Literature

- Katharina Zweig: Ein Algorithmus hat kein Taktgefühl, Heyne, 2019
- Hannah Fry: Hello World, dtv, 2019
- Josh Patterson, Adam Gibson: Deep Learning: A Practitioner's Approach. O'Reilly, 2017
- Jörg Frochte: Maschinelles Lernen Grundlagen und Algorithmen in Python. Hanser Verlag, 2019
- Joshi, Ameet V, Machine Learning and Artificial Intelligence. Springer (2020)
- Datenschutz-Grundverordnung (DSGVO)

Course

Lecturer	Title	SWS
Prof. Dr. Elmar Wings	Machine Learning	4

3.3 Data Management *(Summer semester)*

Lecturer in charge:	Dr. Tirazheh Zare Garizy
Form:	Lectures, exercises, case studies
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MBIDA

Competences

To become a data-driven company, it is essential to understand data management and develop an ecosystem that meets data management requirements. The course will enable students to understand the principles of data management and its use cases. It covers not only the technical and architectural aspects of data collection and processing but also the strategic aspects. Students can use the tools, methods, and guidelines to develop a holistic data management solution. They will also be able to dive deep into specific themes of data management and elaborate them in the relevant application area. Moreover, with case studies and exercises during the course, students will gain hands-on experience and practical skills.
In the era of AI and machine learning, the importance of high-quality data and rich metadata cannot be overstated. Students will learn how metadata enables data discovery, lineage, and governance—critical for trustworthy AI models. They will understand how poor data quality or missing metadata can lead to biased or unreliable AI outcomes.

Content

The lecture includes the principles of data management and covers:

- Data Strategy and Governance: Building a data strategy aligned with business goals, governance frameworks, compliance, and ethical AI considerations.
- Data Architecture: Medallion architecture (Bronze, Silver, Gold layers), Data Vault 2.0 for scalable warehousing, and cloud-native ecosystems.
- Data Warehousing and Data Lakes: Fundamentals of data storage in cloud environments and integration patterns for AI-ready data.
- Metadata Management and Data Quality: Standards, lineage, monitoring, and automation techniques. Emphasis on how metadata supports AI model training, explainability, and compliance.
- Advanced Topics: Designing data-intensive applications, data mesh vs. centralized architectures, master data management, and emerging trends in AI-driven data management.
- Hands-on Exercises and Case Studies: Implementing Medallion architecture, building Data Vault models, designing holistic data management solutions, and preparing datasets for AI use cases.

Literature

- Strengholt, Piethein: Building Medallion Architectures, 2025, O'Reilly
- Strengholt, Piethein: Data Management at Scale, 2nd Edition, 2023, O'Reilly
- DAMA-DMBOK: Data Management Body of Knowledge: 2nd Edition, 2017, DAMA International
- DCAM-Data Management Capability AssessmentModel, Enterprise Data Management Council, 2015
- Linstedt, Daniel; Olschimke, Michael: Building a Scalable Data Warehouse with Data Vault 2.0, 2015, O'Reilly
- Kleppmann, Martin: Designing Data-Intensive Applications, 2017, O'Reilly

Course

Lecturer	Title	SWS
Dr. Tirazheh Zare Garizy	Data Management	4

3.4 IT Security *(Winter semester)*

Lecturer in charge:	Manuel Marowski
Form:	Lecture, group work
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students will be able to:

- Understand and correctly use the technical terminology of IT-Security
- Know the fundamentals of IT risk analysis and IT risk management.
- Explain key security criteria in companies and thus identify potential security risks.
- Classify security risks according to their impact.
- Distinguish between key targets of attack and name protective mechanisms.
- Design and development of a security concept in accordance with the BSI standard.
- Assess the consequences of certain system designs on IT security.
- implement measures to reduce security risks using the example of their own potential vulnerability.
- Contribute to the design and implementation of secure IT infrastructures.

Content

- Fundamentals: IT security at the information and system level; security objectives (including integrity, authenticity, availability); security vs. safety; risk, vulnerability, attack, damage, threat, threat categories, security measures, and security organization and documentation.
- Attack vectors: Types of malware; attacks on distributed systems; attacks at web level; social engineering
- Protection concepts: Authentication/identity management; network security; cryptography and anonymisation; concepts for secure system design (e.g. security standards, security models, BSI basic protection, attack tree/analysis); Digital self-defence (e.g. encrypted communication, data minimisation, secure surfing)
- Interrelation between IT security and ITIL (IT Infrastructure Library)
- Historical development and relevant legal and regulatory requirements

Social and security policy considerations

Literature

- Virgilio Viegas, Oben Kuyucu – IT Security Controls : A Guide to Corporate Standards and Frameworks Apress, Berkeley, 2022
- Marcin Korytowski: Advanced Techniques of Artificial Intelligence in IT Security Systems Springer Verlag, Studies in Big Data, 2024
- William Stallings, Lawrie Brown – Computer Security: Principles and Practice Pearson, Boston, 4. Aufl. 2018
- Ross Anderson – Security Engineering: A Guide to Building Dependable Distributed Systems Wiley, Chichester, 3. Aufl. 2020

Course

Lecturer	Title	SWS
Manuel Marowski	IT Security	4

3.5 Advanced Project Management *(Winter semester)*

Lecturer in charge:	Prof. Dr. Andreas Haja
Form:	Lecture, case studies, group discussion
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

The students are able to plan and execute a technical project. They know the difference between classic and agile project management and are able to form a SCRUM team and independently allocate roles within it. The students are able to establish communication interfaces to other teams and to plan and execute a complex work process. Furthermore, they are able to present the project status and work results in a structured manner.

Content

Over the course of the semester, the students carry out an elaborate business game in the context of which an autonomous small robot is constructed in a team of approx. 6 students. The team is structured according to agile principles and the students learn how to apply the SCRUM method in practice. Furthermore, communication methods are practiced by requiring each team to cooperate with a partner team to solve a common task. In addition, skills for structuring projects, time and resource planning are taught. The lecture will conclude with a hands-on demonstration of the constructed small robots. During the lecture, the theoretical content will be taught, status reports of the teams will be discussed, and individual team coaching will be provided.

Keywords:

- Agile project management, SCRUM, time and resource planning, communicating project status, inter-team communication.

Literature

- A Guide to the Project Management Body of Knowledge (PMBOK® Guide) Sixth Edition and Agile Practice Guide

Course

Lecturer	Title	SWS
Prof. Dr. Andreas Haja	Advanced Project Management	4

3.6 Sustainabile Innovation Management *(Winter semester)*

Lecturer in charge:	Prof. Dr.- Ing. Armando W. Colombo
Form:	Lecture
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

Students will be able to explain the importance of innovation processes and work with international standards for innovation management. They are further able to understand or apply the typical innovation tools such as Technology Readiness Level (TRL), Hype Cycle, Innovation Radar Platform, Strategic Research and Innovation Agendas (SRIAs), Sustainable Development Goals (United Nations), and IP Management Systems.
Students are proficient in using creativity techniques and standardized methods and tools to generate, execute and manage innovation activities.
Students have gained experience in teamwork and presentation techniques during practical phases. The high proportion of self-learning is didactically underpinned by homework.

Content

An organization's ability to innovate is recognized as a key factor for sustained growth, economic viability, increased well-being and the development of society. In this sense, the innovation capabilities of an organization include the ability to understand and respond to changing conditions of its context, to pursue new opportunities and to leverage the knowledge and creativity of people within the organization in collaboration with external interested parties. This module is intended to transfer the background knowledge to students by establishing a coherent, consistent and common framework to: (a) understand the main terms, definitions, concepts and principles of innovation management; (b) learn how an innovation management system and other innovation management standards should be used, with focus on the ISO 56000, ISO 56002 and the Oslo Manual on Innovation; (c) facilitate communication and create awareness on how innovation activities should be planned and executed; (d) learn tools and methods to support innovation management (e.g. Hype Cycle, TRL and SRL, Innovation Radar Questionnaire (definitions and applications), Strategic Research & Innovation Roadmaps and Agendas (SRIAs), Sustainable Development Goals of the UN, IP-Protection and Patenting Processes). In this context, the curriculum of the module provides the fundamental concepts and innovation management principles, describing why organizations should engage in innovation activities.
Innovation is one of the drivers of business success. The aim of this module is to provide practical knowledge about modern innovation techniques in the field of engineering. In this sense, this module provides knowledge about:

- The phases in innovation projects
- Link between Sustainable Innovation Management, International Strategic Research and Innovation Agendas (Roadmaps), and the UN Sustainable Development Goals.
- Excellence, impact and implementation of innovation activities
- Innovation management: methods and tools
- Intellectual property management: patents and intellectual property protection

Literature

- Harvard Business Review: HBR's 10 Must Reads on Innovation; Harvard Business Review Press, 2013
- Dodgson, M. / Gann, D.: The Oxford Handbook of Innovation Management; Oxford University Press, 2014
- The Measurement of Scientific, Technological and Innovation Activities. The OSLO Manual 4th Edition. European Union, Print Catalogue number: KS-01-18-852-EN-C, ISBN 978-92-79-92581-8.
- The Innovation Radar Platform. https://innovation-radar.ec.europa.eu/ ((Access on December 22nd, 2025))
- International Standard ISO 56000, ISO 56002. Innovation Management (Fundamentals and Vocabulary). 2022.
- Vereinte Nationen. Ziele für nachhaltige Entwicklung. https://www.bundesregierung.de/breg-de/aktuelles/nachhaltigkeitsziele-erklaert-232174 (Access on December 22nd, 2025)
- Günther Schuh, Christian Dölle: Sustainable Innovation - Nachhaltig Werte schaffen, Springer Verlag, 2021

Course

Lecturer	Title	SWS
Prof. Dr.-Eng. Armando W. Colombo	Sustainable Innovation Management	4

3.7 Quality Management *(Winter semester)*

Lecturer in charge:	Prof. Dr. Monika Blattmeier
Form:	Lecture
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

Understanding the importance of Quality Management and estimating the potential of QM-oriented approaches. Understanding of QM philosophies and QM dominated thinking and becoming acquainted with QM methods and QM tools. Practice in team-oriented methods as well as deepening of comprehensive thinking. Furthermore, stabilization of structured, documented work approaches plus strengthening of customer-oriented work approach.

Content

- Introduction
- Development and History of QM
- QM philosophies
- ISO 9000 and extended Approaches
- QM Tools and Methods in R&D and Production
- Problem solving Tools
- Improvement Methods
- Management Tools

Literature

- Sommerhoff, B.: QM im Wandel: Personenzentriertes Innovations- und Qualitätsmanagement -München: Hanser, 2021
- Tarvin, P.: Leadership & Management of Machining - München: Hanser, 2016
- Gryna, F.M.: Juran's quality planning & analysis Boston (MA): McGraw-Hill, 2007
- Masing, W.: Handbuch des Qualitätsmanagements - 6. Auflage München: Hanser, 2014
- Linß, G.: Qualitätsmanagement für Ingenieure - München: Fachbuchverlag Leipzig in Hanser, 2011
- Pfeifer, T.: Quality management: strategies, methods, techniques - München: Hanser, 2002
- Hering, E.: Qualitätsmanagement für Ingenieure -5. Auflage- Berlin: Springer, 2003
- Juran, J.M.: Juran's Quality Handbook - 6th edition - New York (NY): McGraw-Hill, 2010
- DIN EN ISO 9000:2015 and related standards
- SA8000; SCC, OHSAS 18001
- actual developments and subjects: Internet

Course

Lecturer	Title	SWS
Prof. Dr. Monika Blattmeier	Quality Management	4

3.8 Leadership & Negotiation *(Summer semester)*

Lecturer in charge:	Dr. Lorenzo Gios
Form:	seminar is based on the assessment-center principle
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MTM

Competences

The module provides students with a solid understanding of key concepts of leadership, negotiation and communication. Upon completion of the module, participants should be able to classify key leadership models and theoretical approaches, assess their strengths and limitations, and reflect on their application in organizational contexts. In addition, they will acquire in-depth knowledge of basic and advanced communication principles-and understand their significance for professional communication and decision-making processes. Students should be enabled to systematically analyze challenges in leadership and negotiation situations and derive theory-based solutions. The module thus contributes to the development of a comprehensive and scientifically sound understanding of how to design effective leadership and negotiation processes.

Content

Students develop technical, methodological, and social-communicative skills that enable them to handle leadership and negotiation situations professionally and reflectively. They acquire the ability to apply leadership models and negotiation techniques to specific issues, prepare negotiations in a structured manner, and select appropriate strategies and tactics in a targeted manner. Methodologically, they are enabled to use analytical tools to evaluate leadership situations, systematically design decision-making processes, and constructively overcome communicative challenges. In the area of social and personal skills, students strengthen their communication skills, conflict resolution skills, and empathy, as well as their ability to reflect on their own leadership and negotiation behavior. Overall, they acquire the competence to act responsibly, cooperatively, and solution-oriented in organizational contexts.

Literature

- Fisher, R., Ury, W., & Patton, B. (2011). Getting to Yes: Negotiating Agreement Without Giving In. Penguin
- Kotter, J. (2012). Leading Change. Harvard Business Review Press.
- Northouse, P. G. (2022). Leadership: Theory and Practice. Sage.
- Wess R., Ross. W. (1996) Make It So: Leadership Lessons from Star Trek: The Next Generation; Gallery Books
- Yukl, G. (2013). Leadership in Organizations. Pearson.
- Hoopes, L. L., & Kelly, M. (2004). Managing change with personal resilience: 21 keys for bouncing back & staying on top in turbulent organizations. MK Books.
- Covey, S. M., & Merrill, R. R. (2006). The speed of trust: The one thing that changes everything. Simon and Schuster.
- Stone, D., Patton, B., & Heen, S. (2023). Difficult conversations: How to discuss what matters most. Penguin.
- Conner, D. R. (2006). Managing at the speed of change: How resilient managers succeed and prosper where others fail. Random House.
- Raines, C. (2002). Managing millennials. Connecting Generations: The Sourcebook, 16.
- Bannys, F. (2012). Interkulturelles Management: Konzepte und Werkzeuge für die Praxis. John Wiley & Sons.

Course

Lecturer	Title	SWS
Dr. Lorenzo Gios	Leadership, Negotiation & Communication	4

3.9 Controlling *(Winter semester)*

Lecturer in charge:	Prof. Dr. Carsten Wilken
Form:	Seminar from lecture, exercises
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	written exam (K2)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

The Controlling module enables students to develop and evaluate corporate management control systems. In particular, students are able to explain, assess, and optimise the effects of system design on decision-making and control processes in companies and organisations. Furthermore, students are able to prepare planning and decision-support calculations, analyse variances, and derive recommendations for action.

In addition, the module includes the ability to prepare and present content in a target-group-oriented manner, to deliver presentations convincingly, and to generate resulting reports in accordance with recognised standards.

For this purpose, students learn the methodologies and instruments of managerial accounting as applied in Anglo-Saxon countries and are able to identify and assess the differences compared to the approaches used in Germany.

Content

- Nature of Costs
- Organizational Architecture
- Budgeting
- Cost Allocation
- Systems of Cost Accounting (Absorption Costing, Variable Costing, Standard Costing)
- Variance Analysis

Literature

- Zimmerman, J.: Accounting for Decision Making and Control; McGraw Hill
- Further current, topic-related literature will be announced during the course

Course

Lecturer	Title	SWS
Prof. Dr. Carsten Wilken	Controlling	4

3.10 Business and IT Law *(Summer semester)*

Lecturer in charge:	n.n.
Form:	Lecture, group work
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students will be able to:

• Name the most important legal regulations in IT and computer law and explain their content.

• Classify legal problems in IT and computer law with regard to risks for companies and private individuals.

• Compare or evaluate various legal issues in the field of IT and computer law based on specific legal criteria.

Apply the legal provisions of IT and computer law to specific cases according to methodically learned rules.

Content

• Constitutional law fundamentals

• Telemedia law

• Electronic commerce law

• IT contract law

• Intellectual property protection (copyright/copyright protection of computer programs, patent law, design law, trademark law)

• Competition and advertising law on the Internet

• Data protection law

• Computer criminal law

• Domain law

Literature

Further literature will be announced in the first lecture

Course

Lecturer	Title	SWS
n.n.	Business and IT Law	4

3.11 ERP-Systems *(Winter semester)*

Lecturer in charge:	Antje Susanne Koch
Form:	Lecture, exercise class, case studies
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H) and written exam (K1)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

Students are able to understand, follow up and apply basic functions of ERP-systems. Different concepts and approaches for technical and conceptual architecture of these systems will be identified and evaluated for their practical employment. Students can be specifying business requirements for typical businesses and their fulfillment by different systems.

Content

The following topics are provided in this module:

- ERP foundation
- Architecture of ERP systems
- Introduction of business processes within ERP systems, applying production and material management as example
- In-depth case study of business processes in ERP systems using the example of finance and controlling
- Project management/-planning for ERP systems implementation.

Literature

- Drumm, C.; Scheuermann, B.; Weidner, S. (2022) Einstieg in SAP S/4HANA: Am Beispiel Global Bike. Ideal für Studium, Einstieg und Weiterbildung (SAP PRESS)
- Gronau, N. (2021) RP-Systeme: Architektur, Management und Funktionen des Enterprise Ressource Planning

Course

Lecturer	Title	SWS
Antje Susanne Koch	ERP-Systems	4

3.12 Business Process Management *(Winter semester)*

Lecturer in charge:	Prof. Dr. Olaf Passenheim
Form:	Seminar from lecture, Serious Gaming, group work
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (H)
ECTS:	5
Prerequisite for participation:	-
Applicability of the module:	MBI

Competences

Students acquire a management-oriented understanding of business processes as key instruments of organizational control and performance. They learn to analyze, design and evaluate processes and to apply basic change management concepts to process-related transformations.

After completing the module, students are able to structure business processes, assess process performance, compare alternative process designs and plan and manage process changes from a managerial perspective.

Content

- Fundamentals and objectives of Business Process Management
- Process-oriented management and value creation
- Process architectures and end-to-end processes
- Process modeling as a management tool
- Analysis and evaluation of business processes
- Principles of process design and optimization
- Trade-offs in process management
- Drivers and phases of process-related change
- Basics of change management in a BPM context

Literature

- Dumas, M., La Rosa, M., Mendling, J., Reijers, H. A. (2018): Fundamentals of Business Process Management. Springer.
- Harmon, P. (2019): Business Process Change. Morgan Kaufmann.
- Ergänzende Literatur / Further Reading
- Kotter, J. P. (2012): Leading Change. Harvard Business Review Press.

Course

Lecturer	Title	SWS
Prof. Dr. Olaf Passenheim	Business Process Management	4

3.13 Project T, B *(Winter-, summer semester)*

Lecturer in charge:	Lecture of the study program
Form:	Solving of a problem independently under the guidance of a supervisor, presentation and discussion of the results preparation of a project report
Type:	Elective module
Contact-Time (h):	30
Self-Study-Time (h):	120
Exam:	Project report (P)
ECTS:	5
Applicability of the module:	MBI, MTTM, MBIDA

Competences

Students are able to independently solve a comprehensive problem in the field of technical projects in Machine Learning and business projects in Business Analytics in a scientifically based manner, applying the knowledge and techniques they have learned.

Content

The topic/problem can be proposed by the examinee but has to be approved by the examiner/supervisor.

Literature

- Question from the field of business informatics
- Literature
- Project dependent literature

Course

Lecturer	**Title**	**SWS**
Lecturer of study program	Project T, B	2

3.14 Current Topic T, B *(Winter-, summer semester)*

Lecturer in charge:	Lecturer of the study program
Form:	Solving of a problem independently under the guidance of a supervisor, presentation and discussion of the results
Type:	Elective module
Contact-Time (h):	30
Self-Study-Time (h):	120
Exam:	Project report (P)
ECTS:	5
Applicability of the module:	MBI, MTTM, MBIDA, MTM

Competences

Students are able to independently solve a comprehensive problem from the field of Business Intelligence and Data Analytics in a scientifically sound manner using the knowledge and techniques they have learned.
The students demonstrate that they are able to deal with the scientific literature on a specific issue in depth and can prepare it in a targeted and structured manner.
Students demonstrate that they have presentation and communication skills that enable them to present topics they have developed themselves in a clear and structured manner and to discuss their applicability to practice.

Content

Students work on a scientific-application-oriented problem in the area of business. In lectures by the lecturers, the most important theories as well as current research results on a specific topic from the fields of technology or business are presented. By reading scientific literature (self-study), students deepen their knowledge of theories and methods in the field and learn how to use scientific literature. At the end of the course, students will be able to establish a relationship between the research question and scientific theories and research results.

Literature

Slides, case studies, scientific literature

Course

Lecturer	**Title**	**SWS**
Lehrbeauftragte des Studiengangs	Current Topic T, B	2