

# MODULE HANDBOOK

**Bachelor of Science**

Artificial Intelligence (FS-OI-BAAI)

**180 ECTS**

**Distance Learning**

Classification: Undergraduate

# Contents

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## 1. Semester

### **Module DLBDSEAIS1: Artificial Intelligence**

Module Description .....	13
Course DLBDSEAIS01: Artificial Intelligence .....	15

### **Module DLBCSIAW: Introduction to Academic Work**

Module Description .....	19
Course DLBCSIAW01: Introduction to Academic Work .....	21

### **Module DLBDSIPWP: Introduction to Programming with Python**

Module Description .....	25
Course DLBDSIPWP01: Introduction to Programming with Python .....	27

### **Module DLBDSMFC: Mathematics: Analysis**

Module Description .....	31
Course DLBDSMFC01: Mathematics: Analysis .....	33

### **Module DLBCSCW: Collaborative Work**

Module Description .....	37
Course DLBCSCW01: Collaborative Work .....	39

### **Module DLBDSSPDS: Statistics: Probability and Descriptive Statistics**

Module Description .....	43
Course DLBDSSPDS01: Statistics: Probability and Descriptive Statistics .....	45

---

## 2. Semester

### **Module DLBDSOOFPP: Object Oriented and Functional Programming with Python**

Module Description .....	53
Course DLBDSOOFPP01: Object oriented and functional programming in Python .....	55

### **Module DLBDSMFLA: Mathematics: Linear Algebra**

Module Description .....	59
Course DLBDSMFLA01: Mathematics: Linear Algebra .....	61

### **Module DLBCSIDM: Intercultural and Ethical Decision-Making**

Module Description .....	65
Course DLBCSIDM01: Intercultural and Ethical Decision-Making .....	67

**Module DLBDSSIS: Statistics - Inferential Statistics**

Module Description .....	71
Course DLBDSSIS01: Statistics - Inferential Statistics .....	73

**Module DLBDSCC: Cloud Computing**

Module Description .....	77
Course DLBDSCC01: Cloud Computing .....	79

**Module DLBSEPCP\_E: Cloud Programming**

Module Description .....	83
Course DLBSEPCP01_E: Cloud Programming .....	85

**3. Semester****Module DLBDSMLS: Machine Learning - Supervised Learning**

Module Description .....	93
Course DLBDSMLS01: Machine Learning - Supervised Learning .....	95

**Module DLBDSMLUSL: Machine Learning - Unsupervised Learning and Feature Engineering**

Module Description .....	99
Course DLBDSMLUSL01: Machine Learning - Unsupervised Learning and Feature Engineering .....	101

**Module DLBDSNNDL: Neural Nets and Deep Learning**

Module Description .....	105
Course DLBDSNNDL01: Neural Nets and Deep Learning .....	107

**Module DLBAICV: Introduction to Computer Vision**

Module Description .....	111
Course DLBAICV01: Introduction to Computer Vision .....	113

**Module DLBAIPCV: Project: Computer Vision**

Module Description .....	117
Course DLBAIPCV01: Project: Computer Vision .....	119

**Module DLBAIIRL: Introduction to Reinforcement Learning**

Module Description .....	123
Course DLBAIIRL01: Introduction to Reinforcement Learning .....	125

**4. Semester****Module DLBAIINLP: Introduction to NLP**

Module Description .....	133
Course DLBAIINLP01: Introduction to NLP .....	135

<b>Module DLBAIPNLP : Project: NLP</b>	
Module Description . . . . .	139
Course DLBAIPNLP01: Project: NLP . . . . .	141
<b>Module DLBCSIDPITS: Introduction to Data Protection and Cyber Security</b>	
Module Description . . . . .	143
Course DLBCSIDPITS01: Introduction to Data Protection and Cyber Security . . . . .	145
<b>Module DLBDSSE: Data Science Software Engineering</b>	
Module Description . . . . .	149
Course DLBDSSE01: Data Science Software Engineering . . . . .	151
<b>Module DLBDSMTP: Project: From Model to Production</b>	
Module Description . . . . .	155
Course DLBDSMTP01: Project: From Model to Production . . . . .	157
<b>Module DLBDSSECDs: Seminar: Ethical Considerations in Data Science</b>	
Module Description . . . . .	161
Course DLBDSSECDs01: Seminar: Ethical Considerations in Data Science . . . . .	163

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## 5. Semester

<b>Module DLBMIUEX1_E: User Experience</b>	
Module Description . . . . .	171
Course DLBMIUEX01_E: User Experience . . . . .	173
<b>Module DLBMIUEX2_E: UX-Project</b>	
Module Description . . . . .	177
Course DLBMIUEX02_E: UX-Project . . . . .	179
<b>Module DLBAIPEAI: Project: Edge AI</b>	
Module Description . . . . .	181
Course DLBAIPEAI01: Project: Edge AI . . . . .	183
<b>Module DLBROIR_E: Introduction to Robotics</b>	
Module Description . . . . .	187
Course DLBROIR01_E: Introduction to Robotics . . . . .	189
<b>Module DLBCSAPM: Agile Project Management</b>	
Module Description . . . . .	193
Course DLBCSAPM01: Agile Project Management . . . . .	195
<b>Module DLBDSEAD: Autonomous Driving</b>	
Module Description . . . . .	199

Course DLBDSEAD01: Self-Driving Vehicles .....	201
Course DLBDSEAD02: Seminar: Current Topics and Trends in Self-Driving Technology .....	205
<b>Module DLBDSEAR: Automation and Robotics</b>	
Module Description .....	209
Course DLBDSEAR01: Production Engineering .....	212
Course DLBDSEAR02: Automation and Robotics .....	216
<b>Module DLBDSEDE: Data Engineer</b>	
Module Description .....	221
Course DLBDSEDE01: Data Engineering .....	223
Course DLBDSEDE02: Project: Data Engineering .....	226
<b>Module DLBAIEDSPST: Digital Signal Processing and Sensor Technology</b>	
Module Description .....	229
Course DLBROEICR01_E: Digital Signal Processing .....	231
Course DLBROST01_E: Sensor Technology .....	235
<b>Module DLBAIEDD: Database Developer</b>	
Module Description .....	239
Course DLBCSDMS01: Database Modeling and Database Systems .....	242
Course DLBDSPBDM01: Project: Build a Data Mart in SQL .....	245
<b>Module DLBCSEBI: Business Intelligence</b>	
Module Description .....	249
Course DLBCSEBI01: Business Intelligence .....	251
Course DLBCSEBI02: Project: Business Intelligence .....	255
<b>Module DLBDSEDA: Data Analyst</b>	
Module Description .....	257
Course DLBDSEDA01: Advanced Data Analysis .....	259
Course DLBDSEDA02: Project: Data Analysis .....	262
<b>Module DLBMIAMVR_E: Augmented, Mixed and Virtual Reality</b>	
Module Description .....	265
Course DLBMIAMVR01_E: Augmented, Mixed and Virtual Reality .....	267
Course DLBMIAMVR02_E: X-Reality Project .....	271

---

## 6. Semester

<b>Module DLBDSEIMB: International Marketing and Branding</b>	
Module Description .....	277
Course DLBDSEIMB01: International Marketing .....	280
Course DLBDSEIMB02: International Brand Management .....	284

**Module DLBDSEAS: Applied Sales**

Module Description .....	289
Course DLBDSEAS01: Applied Sales I .....	292
Course DLBDSEAS02: Applied Sales II .....	296

**Module DLBDSESCM: Supply Chain Management**

Module Description .....	301
Course DLBDSESCM01: Supply Chain Management I .....	304
Course DLBDSESCM02: Supply Chain Management II .....	308

**Module DLBDSEFSM: Financial Services Management**

Module Description .....	313
Course DLBDSEFSM01: Financial Services Management I .....	315
Course DLBDSEFSM02: Financial Services Management II .....	318

**Module DLBCSEITPAM: IT project and architecture management**

Module Description .....	321
Course DLBCSEITPAM01: IT Project Management .....	324
Course DLBCSEITPAM02: IT Architecture Management .....	328

**Module DLBKPSWPMCI\_E: Psychology of Human Computer Interaction**

Module Description .....	331
Course DLBUXEP01_E: Experience Psychology .....	333
Course DLBUXHCI01_E: Human Computer Interaction .....	337

**Module DLBDSEAD: Autonomous Driving**

Module Description .....	341
Course DLBDSEAD01: Self-Driving Vehicles .....	343
Course DLBDSEAD02: Seminar: Current Topics and Trends in Self-Driving Technology .....	347

**Module DLBDSEAR: Automation and Robotics**

Module Description .....	351
Course DLBDSEAR01: Production Engineering .....	354
Course DLBDSEAR02: Automation and Robotics .....	358

**Module DLBDSEDE: Data Engineer**

Module Description .....	363
Course DLBDSEDE01: Data Engineering .....	365
Course DLBDSEDE02: Project: Data Engineering .....	368

**Module DLBAIEDSPST: Digital Signal Processing and Sensor Technology**

Module Description .....	371
Course DLBROEICR01_E: Digital Signal Processing .....	373
Course DLBROST01_E: Sensor Technology .....	377

**Module DLBAIEDD: Database Developer**

Module Description .....	381
Course DLBCSDMS01: Database Modeling and Database Systems .....	384
Course DLBDSPBDM01: Project: Build a Data Mart in SQL .....	387

**Module DLBCSEBI: Business Intelligence**

Module Description .....	391
Course DLBCSEBI01: Business Intelligence .....	393
Course DLBCSEBI02: Project: Business Intelligence .....	397

**Module DLBDSEDA: Data Analyst**

Module Description .....	399
Course DLBDSEDA01: Advanced Data Analysis .....	401
Course DLBDSEDA02: Project: Data Analysis .....	404

**Module DLBMIAMVR\_E: Augmented, Mixed and Virtual Reality**

Module Description .....	407
Course DLBMIAMVR01_E: Augmented, Mixed and Virtual Reality .....	409
Course DLBMIAMVR02_E: X-Reality Project .....	413

**Module DLBDSEIMB: International Marketing and Branding**

Module Description .....	415
Course DLBDSEIMB01: International Marketing .....	418
Course DLBDSEIMB02: International Brand Management .....	422

**Module DLBDSEAS: Applied Sales**

Module Description .....	427
Course DLBDSEAS01: Applied Sales I .....	430
Course DLBDSEAS02: Applied Sales II .....	434

**Module DLBDSESCM: Supply Chain Management**

Module Description .....	439
Course DLBDSESCM01: Supply Chain Management I .....	442
Course DLBDSESCM02: Supply Chain Management II .....	446

**Module DLBDSEFSM: Financial Services Management**

Module Description .....	451
Course DLBDSEFSM01: Financial Services Management I .....	453
Course DLBDSEFSM02: Financial Services Management II .....	456

**Module DLBCSEITPAM: IT project and architecture management**

Module Description .....	459
Course DLBCSEITPAM01: IT Project Management .....	462
Course DLBCSEITPAM02: IT Architecture Management .....	466



<b>Module DLBKPSWPMCI_E: Psychology of Human Computer Interaction</b>	
Module Description . . . . .	469
Course DLBUXEP01_E: Experience Psychology . . . . .	471
Course DLBUXHCI01_E: Human Computer Interaction . . . . .	475
<b>Module DLFLI: Foreign Language Italian</b>	
Module Description . . . . .	479
Course DLFLI01: Foreign Language Italian . . . . .	482
<b>Module DLFLF: Foreign Language French</b>	
Module Description . . . . .	487
Course DLFLF01: Foreign Language French . . . . .	490
<b>Module DLFLT: Foreign Language Turkish</b>	
Module Description . . . . .	495
Course DLFLT01: Foreign Language Turkish . . . . .	497
<b>Module DLSPGLA: German Language</b>	
Module Description . . . . .	499
Course DLSPGLA01: Foreign Language: German . . . . .	501
<b>Module DLFLS: Foreign Language Spanish</b>	
Module Description . . . . .	505
Course DLFLS01: Foreign Language Spanish . . . . .	508
<b>Module DLBBT: Bachelor Thesis</b>	
Module Description . . . . .	513
Course DLBBT01: Bachelor Thesis . . . . .	515
Course DLBBT02: Colloquium . . . . .	518

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2021-12-01



# 1. Semester

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# Artificial Intelligence

Module Code: DLBDSEAIS1

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

Prof. Dr. Ulrich Kerzel (Artificial Intelligence)

## Contributing Courses to Module

- Artificial Intelligence (DLBDSEAIS01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- chart the historical developments in artificial intelligence.
- understand the approach of contemporary AI systems.
- comprehend the concepts behind reinforcement learning.
- analyze natural language using basic NLP techniques.
- scrutinize images and their contents.

**Learning Outcomes****Artificial Intelligence**

On successful completion, students will be able to

- chart the historical developments in artificial intelligence.
- understand the approach of contemporary AI systems.
- comprehend the concepts behind reinforcement learning.
- analyze natural language using basic NLP techniques.
- scrutinize images and their contents.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Artificial Intelligence

Course Code: DLBDSEAIS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The quest for artificial intelligence (AI) has captured humanity's interest for many decades and has been an active research area since the 1960s. This course will give a detailed overview of the historical developments, successes, and set-backs in AI, as well as modern approaches in the development of artificial intelligence. This course gives an introduction to reinforcement learning, a process similar to how humans and animals experience the world: exploring the environment and inferring the best course of action. This course also covers the principles of natural language processing and computer vision, both of which are key ingredients for an artificial intelligence to be able to interact with its environment.

## Course Outcomes

On successful completion, students will be able to

- chart the historical developments in artificial intelligence.
- understand the approach of contemporary AI systems.
- comprehend the concepts behind reinforcement learning.
- analyze natural language using basic NLP techniques.
- scrutinize images and their contents.

## Contents

1. History of AI
  - 1.1 Historical developments
  - 1.2 AI winter
  - 1.3 Expert systems
  - 1.4 Notable advances
2. Modern AI Systems
  - 2.1 Narrow versus general AI
  - 2.2 Application areas
3. Reinforcement Learning
  - 3.1 What is reinforcement learning?
  - 3.2 Markov Chains and value function
  - 3.3 Time-difference and Q Learning

4. Natural Language Processing (NLP)
  - 4.1 Introduction to NLP and application areas
  - 4.2 Basic NLP techniques
  - 4.3 Vectorizing data
5. Computer Vision
  - 5.1 Pixels and filters
  - 5.2 Feature detection
  - 5.3 Distortions and calibration
  - 5.4 Semantic segmentation

## Literature

### Compulsory Reading

### Further Reading

- Bear, F./Barry, W./Paradiso, M. (2006): Neuroscience: Exploring the brain. 3rd ed., Lippincott Williams and Wilkins, Baltimore, MD:
- Bird S./Klein, E./Loper, E. (2009): Natural language processing with Python. 2nd ed., O'Reilly, Sebastopol, CA.
- Chollet, F. (2017): Deep learning with Python. Manning, Shelter Island, NY.
- Fisher, R. B., et al. (2016) : Dictionary of computer vision and image processing. John Wiley & Sons, Chichester.
- Geron, A. (2017): Hands-on machine learning with Scikit-Learn and TensorFlow. O'Reilly, Boston, MA.
- Goodfellow, I./Bengio, Y./Courville, A. (2016): Deep learning. MIT Press, Boston, MA.
- Grus, J. (2019): Data science from scratch: First principles with Python. O'Reilly, Sebastopol, CA.
- Jurafsky, D./Martin, J. H. (2008): Speech and language processing. Prentice Hall, Upper Saddle River, NJ.
- Nilsson, N. (2009): The quest for artificial intelligence. Cambridge University Press, Cambridge.
- Russell, S./Norvig, P. (2009): Artificial intelligence: A modern approach. 3rd ed., Pearson, Essex.
- Sutton, R./Barto, A. (2018): Reinforcement learning: An introduction. 2nd ed., MIT Press, Boston, MA.
- Szelski, R. (2011): Computer vision: Algorithms and applications. 2nd ed., Springer VS, Wiesbaden.
- Szepesvári, C. (2010): Algorithms for reinforcement learning. Morgan & Claypool, San Rafael, CA.
- Wiering, M./Otterlo, M. (2012): Reinforcement learning: State of the art. Springer, Berlin.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAIS01

## Introduction to Academic Work

Module Code: DLBCSIAW

Module Type	Admission Requirements	Study Level	CP	Student Workload
s. Curriculum/see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	
s. Curriculum/see curriculum	Minimum 1 semester	WiSe/SoSe	

### Module Coordinator

Prof. Dr. Maya Stagge (Introduction to Academic Work)

### Contributing Courses to Module

- Introduction to Academic Work (DLBCSIAW01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Workbook

#### Split Exam

### Weight of Module

s. Curriculum/see curriculum

### Module Contents

- Scientific Theoretical Foundations and Research Paradigms
- Application of Good Scientific Practice
- Methodology
- Librarianship: Structure, Use, and Literature Management
- Forms of Scientific Work at IUBH

### Learning Outcomes

#### Introduction to Academic Work

Nach erfolgreichem Abschluss sind die Studierenden in der Lage, /On successful completion, students will be able to

- understand and apply formal criteria of a scientific work.
- distinguish basic research methods and identify criteria of good scientific practice.
- describe central scientific theoretical basics and research paradigms and their effects on scientific research results.
- use literature databases, literature administration programs, and other library structures properly; avoid plagiarism; and apply citation styles correctly.
- apply the evidence criteria to scientific texts.
- define a research topic and derive a structure for scientific texts.
- compile a list of literature, illustrations, tables, and abbreviations for scientific texts.
- understand and distinguish between the different forms of scientific work at IUBH.

#### Links to other Modules within the Study Program

This module is similar to other modules in the field of Methods

#### Links to other Study Programs of IUBH

All Bachelor Programmes in the Business & Management field

## Introduction to Academic Work

Course Code: DLBCSIAW01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The application of good scientific practice is one of the basic academic qualifications that should be acquired while studying. This course deals with the distinction between everyday knowledge and science. This requires a deeper understanding of the theory of science, as well as the knowledge of basic research methods and instruments for writing scientific texts. The students therefore gain initial insight into academic research and are introduced to the basic knowledge that will help them in the future to produce scientific papers. In addition, the students receive an overview of the different IUBH examination forms and insight into their requirements and implementation.

### Course Outcomes

Nach erfolgreichem Abschluss sind die Studierenden in der Lage,/On successful completion, students will be able to

- understand and apply formal criteria of a scientific work.
- distinguish basic research methods and identify criteria of good scientific practice.
- describe central scientific theoretical basics and research paradigms and their effects on scientific research results.
- use literature databases, literature administration programs, and other library structures properly; avoid plagiarism; and apply citation styles correctly.
- apply the evidence criteria to scientific texts.
- define a research topic and derive a structure for scientific texts.
- compile a list of literature, illustrations, tables, and abbreviations for scientific texts.
- understand and distinguish between the different forms of scientific work at IUBH.

### Contents

1. Theory of Science
  - 1.1 Introduction to Science and Research
  - 1.2 Research Paradigms
  - 1.3 Fundamental Research Decisions
  - 1.4 Effects of Scientific Paradigms on Research Design

2. Application of Good Scientific Practice
  - 2.1 Research Ethics
  - 2.2 Evidence Teaching
  - 2.3 Data Protection and Affidavit
  - 2.4 Orthography and Shape
  - 2.5 Identification and Delimitation of Topics
  - 2.6 Research Questions and Structure
3. Research Methods
  - 3.1 Empirical Research
  - 3.2 Literature and Reviews
  - 3.3 Quantitative Data Collection
  - 3.4 Qualitative Data Collection
  - 3.5 Mix of Methods
  - 3.6 Critique of Methods and Self-Reflection
4. Librarianship: Structure, Use, and Literature Management
  - 4.1 Plagiarism Prevention
  - 4.2 Database Research
  - 4.3 Literature Administration
  - 4.4 4.4 Citation and Author Guidelines
  - 4.5 4.5 Bibliography
5. Scientific Work at the IUBH – Research Essay
6. Scientific Work at the IUBH - Project Report
7. Scientific Work at the IUBH - Case Study
8. Scientific Work at the IUBH - Bachelor Thesis
9. Scientific Work at the IUBH – Oral Assignment
10. Scientific Work at the IUBH – Oral Project Report
11. Scientific Work at the IUBH - Colloquium
12. Scientific Work at the IUBH - Portfolio
13. Scientific Work at the IUBH - Exam

**Literature****Compulsory Reading****Further Reading**

- Bortz, J./Döring, N. (2012): Forschungsmethoden und Evaluation. Für Human- und Sozialwissenschaftler. 5. Auflage, Springer Medizin Verlag, Heidelberg.
- Braunecker, C. (2016): How to do Empirie, how to do SPSS – eine Gebrauchsanleitung. Facultas Verlags- und Buchhandels AG, Wien.
- Engelen, E.M. et al. (2010): Heureka – Evidenzkriterien in den Wissenschaften, ein Kompendium für den interdisziplinären Gebrauch. Spektrum akademischer Verlag, Heidelberg.
- Flick, U. et al. (2012): Handbuch Qualitative Sozialforschung. Grundlagen, Konzepte, Methoden und Anwendungen. 3. Auflage, Beltz Verlag, Weinheim.
- Hug, T./Poscheschnik, G. (2015): Empirisch Forschen, 2. Auflage, Verlag Huter & Roth KG, Wien.
- Hussy, W. et al. (2013): Forschungsmethoden in Psychologie und Sozialwissenschaften. 2. Auflage, Springer Medizin Verlag, Heidelberg.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Workbook

<b>Student Workload</b>					
<b>Self Study</b> 110 h	<b>Presence</b> 0 h	<b>Tutorial</b> 20 h	<b>Self Test</b> 20 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed



## Introduction to Programming with Python

Module Code: DLBDSIPWP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Dr. Reza Shahbazfar (Introduction to Programming with Python)

### Contributing Courses to Module

- Introduction to Programming with Python (DLBDSIPWP01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Python as a programming language for data science
- Variables and built-in datatypes
- Statements and functions
- Error and exception handling
- Important Python data science modules

**Learning Outcomes****Introduction to Programming with Python**

On successful completion, students will be able to

- use fundamental Python syntax.
- recollect common elementary data types.
- recognize foundational programming concepts and their realization in Python.
- understand error handling and logging.
- create working programs.
- list the most important libraries and packages for data science.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field(s) of Data Science & Artificial Intelligence.

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology field(s).

# Introduction to Programming with Python

Course Code: DLBDSIPWP01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course provides students with a foundational understanding of the Python programming language. Following an introductory exposition to the importance of Python for data science-related programming tasks, students will be acquainted with fundamental programming concepts like variables, data types, and statements. Building on this basis, the important notion of a function is explained and errors, exception handling, and logging are explicated. The course concludes with an overview of the most widely-used library packages for data science.

## Course Outcomes

On successful completion, students will be able to

- use fundamental Python syntax.
- recollect common elementary data types.
- recognize foundational programming concepts and their realization in Python.
- understand error handling and logging.
- create working programs.
- list the most important libraries and packages for data science.

## Contents

1. Introduction
  - 1.1 Why Python?
  - 1.2 Obtaining and installing Python
  - 1.3 The Python interpreter , IPython, and Jupyter
2. Variables and Data Types
  - 2.1 Variables and value assignment
  - 2.2 Numbers
  - 2.3 Strings
  - 2.4 Collections
  - 2.5 Files

3. Statements
  - 3.1 Assignment, expressions, and print
  - 3.2 Conditional statements
  - 3.3 Loops
  - 3.4 Iterators and comprehensions
4. Functions
  - 4.1 Function declaration
  - 4.2 Scope
  - 4.3 Arguments
5. Errors and Exceptions
  - 5.1 Errors
  - 5.2 Exception handling
  - 5.3 Logs
6. Modules and Packages
  - 6.1 Usage
  - 6.2 Namespaces
  - 6.3 Documentation
  - 6.4 Popular data science packages

## Literature

### Compulsory Reading

### Further Reading

- Barry, P. (2016): Head first Python: A brain-friendly guide. 2nd ed., O'Reilly, Sebastopol, CA.
- Lubanovic, B. (2019): Introducing Python. 2nd ed., O'Reilly, Sebastopol, CA.
- Lutz, M. (2013): Learning Python. 5th ed., O'Reilly, Sebastopol, CA.
- Matthes, E. (2019): Python crash course: A hands-on, project-based introduction to programming. 2nd ed., No Starch Press, San Francisco, CA.
- Ramalho, L. (2015): Fluent Python: Clear, concise, and effective programming. O'Reilly, Sebastopol, CA.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSIPWP01

## Mathematics: Analysis

Module Code: DLBDSMFC

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Timo Heinisch (Mathematics: Analysis)

### Contributing Courses to Module

- Mathematics: Analysis (DLBDSMFC01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Sequences and series
- Functions & reverse functions
- differential calculus
- integral calculus

**Learning Outcomes****Mathematics: Analysis**

On successful completion, students will be able to

- summarize the basic concepts of analysis.
- illustrate the terms "consequences" and "series".
- explain the concept of function and to understand the concept of the inverse function.
- explain basic statements of the differential and integral calculus.
- explain the relationship between differentiation and integration.
- master the derivation of higher-dimensional functions.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Methods

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields



# Mathematics: Analysis

Course Code: DLBDSMFC01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Analysis is one of the essential basic subjects of mathematics. Originally developed to be able to formulate and solve problems of classical mechanics mathematically, in its present rigorous form it has become indispensable in numerous applications in the natural sciences and technology. This module aims to introduce the basic hand tool of differential and integral calculus and to explain their mutual interrelations. In addition, the differential calculus is generalized to multidimensional spaces.

## Course Outcomes

On successful completion, students will be able to

- summarize the basic concepts of analysis.
- illustrate the terms "consequences" and "series".
- explain the concept of function and to understand the concept of the inverse function.
- explain basic statements of the differential and integral calculus.
- explain the relationship between differentiation and integration.
- master the derivation of higher-dimensional functions.

## Contents

1. Sequences and series
  - 1.1 Sequences and series
  - 1.2 Convergence of infinite series
  - 1.3 power series
2. Functions and reverse functions
  - 2.1 Continuous functions
  - 2.2 Exponential and logarithm function
  - 2.3 Trigonometric functions and their inverse functions
3. Differential calculus
  - 3.1 Derivatives and higher derivatives
  - 3.2 curve discussion
  - 3.3 Rules (chain rule, product rule, quotient rule ...)
  - 3.4 Taylor Rows

4. Integral calculus
  - 4.1 The Riemann Integral
  - 4.2 Specific and indefinite integrals
  - 4.3 The fundamental theorem of differential and integral calculus
  - 4.4 Volumes and shells of rotary bodies
  - 4.5 Paths and lengths
5. Differential calculus in the  $\mathbb{R}^n$ 
  - 5.1 Partial Derivation
  - 5.2 Total Derivation
  - 5.3 Gradients of vector-valued functions and matrices

**Literature****Compulsory Reading****Further Reading**

- Arens, T. et al. (2013): Basic knowledge of mathematics studies. Analysis and Linear Algebra with Cross Connections. Springer, Berlin/Heidelberg.
- Boas, M. L. (2006): Mathematical methods in the physical sciences. Third edition. Wiley. Hoboken, NJ.
- Deisenroth, M. P./Faisal, A./Ong C.-S.: Math for ML. Cambridge University Press.
- Heuser, H. (2009): Textbook of Analysis. Vieweg + Teubner (studies). Wiesbaden.
- Modler, F./Kreh, M. (2014): Tutorial Analysis 1 and Linear Algebra 1. Mathematics explained and commented by students for students. 3rd edition, Springer Spektrum, Berlin/Heidelberg.
- Papula, L. (2014): Mathematics for engineers and scientists. Vol. 1: A textbook and workbook for basic studies. Springer Vieweg, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input checked="" type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSMFC01

## Collaborative Work

Module Code: DLBCSCW

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Karin Halbritter (Collaborative Work)

### Contributing Courses to Module

- Collaborative Work (DLBCSCW01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Oral Assignment

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Self-Directed and Collaborative Learning
- Networking and Cooperation
- Performance in (Virtual) Teams
- Communication, Arguments, and Being Convincing
- Potentials for Conflict and Managing Conflicts
- Self-Management and Personal Skills

**Learning Outcomes****Collaborative Work**

On successful completion, students will be able to

- design their own self-directed and collaborative learning processes with analog and digital media.
- initiate local and virtual cooperation and select suitable methods for shaping cooperation.
- assess different forms of communication in relation to the goals and requirements of different situations and reflect one's own communication and argumentation behaviour.
- explain potentials for conflict and the role of emotions in conflicts and describe the use of systemic methods in the target- and solution-oriented handling of conflicts.
- form an idea of one's own resources, present methods of self-management and self-motivation, and derive appropriate strategies.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Business Administration & Management

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Business & Management fields

## Collaborative Work

Course Code: DLBCSCW01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The course supports the students in building up and expanding important interdisciplinary competences for our networked world, and in doing so, students can take advantage of the opportunities for constructive cooperation with others. It presents essential forms and design possibilities of collaborative learning and working, imparts basic knowledge and tools for self-managed, flexible, and creative thinking, learning and acting and familiarizes students with the topics of empathy and emotional intelligence. Students are also encouraged to use the course contents. In this way, they promote their autonomous competence to act and their competence in the interactive application of tools and in interacting in heterogeneous groups.

### Course Outcomes

On successful completion, students will be able to

- design their own self-directed and collaborative learning processes with analog and digital media.
- initiate local and virtual cooperation and select suitable methods for shaping cooperation.
- assess different forms of communication in relation to the goals and requirements of different situations and reflect one's own communication and argumentation behaviour.
- explain potentials for conflict and the role of emotions in conflicts and describe the use of systemic methods in the target- and solution-oriented handling of conflicts.
- form an idea of one's own resources, present methods of self-management and self-motivation, and derive appropriate strategies.

### Contents

1. Learning for a Networked World in a Networked World
  - 1.1 Requirements and Opportunities of the VUCA World
  - 1.2 Learning, Information, and Dealing with Knowledge and Ignorance
  - 1.3 C-Model: Collective – Collaborative – Continuous – Connected
  - 1.4 Checking Your Own Learning Behaviour
2. Networking and Cooperation
  - 2.1 Finding and Winning Suitable Cooperation Partners
  - 2.2 Sustainable Relationships: Digital Interaction and Building Trust
  - 2.3 Collaboration: Organizing Locally and Virtually and Using Media
  - 2.4 Social Learning: Agile, Collaborative, and Mobile Planning of Learning Processes

3. Performance in (Virtual) Teams
  - 3.1 Goals, Roles, Organization and Performance Measurement
  - 3.2 Team Building and Team Flow
  - 3.3 Scrum as a Framework for Agile Project Management
  - 3.4 Design Thinking, Kanban, Planning Poker, Working-in-Progress-Limits & Co
4. Communicate and Convince
  - 4.1 Communication as Social Interaction
  - 4.2 Language, Images, Metaphors, and Stories
  - 4.3 It's the Attitude that Counts: Open, Empathetic, and Appreciative Communication
  - 4.4 Listen Actively - Argue - Convince - Motivate
  - 4.5 Analyze Your Own Conversational and Argumentational Skills
5. Recognize Conflict Potentials - Handle Conflicts - Negotiate Effectively
  - 5.1 Respecting Diversity - Seizing Opportunities
  - 5.2 Developing Empathy for Yourself and Others
  - 5.3 Systemic Work Solutions and Reframing
  - 5.4 Negotiate Constructively: Finding Clear Words - Interests Instead of Positions
6. Realize Your Own Projects
  - 6.1 Set Goals Effectively - Focus - Reflect
  - 6.2 The Agile Use of One's Own Time
  - 6.3 (Self-)Coaching and Inner Team
  - 6.4 Strategies and Methods for Self-Management and Self-Motivation
7. Mobilize Your Resources
  - 7.1 Recognizing Resources - Regulating Emotions
  - 7.2 Reflection and Innovation - Lateral Thinking and Creativity
  - 7.3 Transfer Strength and Willpower: Analyzing and Controlling Condition Factors
8. Construction Kit: Overview of Concepts, Tools, and Methods
  - 8.1 Communicate, Cooperate, Negotiate, Argue
  - 8.2 Think, Reflect, Develop Ideas, Decide, Lead Yourself



**Literature****Compulsory Reading****Further Reading**

- Baber, A. (2015): Strategic connections. The new face of networking in a collaborative world. Amacom, New York.
- Goleman, D. (2013): Focus. The hidden driver of excellence. Harper Collins USA, New York.
- Kaats, E./Opheij, W. (2014): Creating conditions for promising collaboration. Alliances, networks, chains, strategic partnerships. Springer Management, Berlin.
- Lang, M. D. (2019): The guide to reflective practice in conflict resolution. Rowman & Littlefield, Lanham/Maryland.
- Martin, S. J./Goldstein, N. J./Cialdini, R. B. (2015): The small BIG. Small changes that spark BIG influence. Profile Books, London.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Oral Assignment

<b>Student Workload</b>					
<b>Self Study</b> 110 h	<b>Presence</b> 0 h	<b>Tutorial</b> 20 h	<b>Self Test</b> 20 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Statistics: Probability and Descriptive Statistics

Module Code: DLBDSSPDS

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Dr. Stefan Stöckl (Statistics: Probability and Descriptive Statistics )

### Contributing Courses to Module

- Statistics: Probability and Descriptive Statistics (DLBDSSPDS01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Probability
- Random variables
- Joint distributions
- Expectation and variance
- Inequalities and limit theorems

**Learning Outcomes****Statistics: Probability and Descriptive Statistics**

On successful completion, students will be able to

- define probability, random variable, and probability distribution.
- understand the concept of Bayesian statistics.
- grasp the definition of joint and marginal distributions.
- calculate expectation values and higher moments.
- comprehend important inequality equations and limit theorems.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Methods

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Business & Management fields

# Statistics: Probability and Descriptive Statistics

Course Code: DLBDSSPDS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Statistical description and analysis are the foundations for data-driven analysis and prediction methods. This course introduces the fundamentals, beginning with a formal definition of probabilities and introduction to the concepts underlying Bayesian statistics. Random variables and probability density distributions are then discussed, as well as the concept of joint and marginal distributions. The importance of various discrete and continuous distributions and their applications is stressed. Characterizing distributions is an important aspect of describing the behavior of probability distributions. Students are familiarized with expectation values, variance, and covariance. The concepts of algebraic and central moments and moment-generating functions complement the characterization of probability distributions. Finally, this course focuses on important inequalities and limit theorems such as the law of large numbers or the central limit theorem.

## Course Outcomes

On successful completion, students will be able to

- define probability, random variable, and probability distribution.
- understand the concept of Bayesian statistics.
- grasp the definition of joint and marginal distributions.
- calculate expectation values and higher moments.
- comprehend important inequality equations and limit theorems.

## Contents

1. Probability
  - 1.1 Definitions
  - 1.2 Independent events
  - 1.3 Conditional probability
  - 1.4 Bayesian statistics
2. Random Variables
  - 2.1 Random Variables
  - 2.2 Distribution functions and probability mass functions
  - 2.3 Important discrete probability distributions
  - 2.4 Important continuous probability distributions

3. Joint Distributions
  - 3.1 Joint distributions
  - 3.2 Marginal distributions
  - 3.3 Independent random variables
  - 3.4 Conditional distributions
4. Expectation and Variance
  - 4.1 Expectation of a random variable, conditional expectations
  - 4.2 Variance and covariance
  - 4.3 Expectations and variances of important probability distributions
  - 4.4 Algebraic and central moments
  - 4.5 Moment-generating functions
5. Inequalities and Limit Theorems
  - 5.1 Probability inequalities
  - 5.2 Inequalities for expectations
  - 5.3 The law of large numbers
  - 5.4 Central limit theorem

**Literature****Compulsory Reading****Further Reading**

- Bruce, P., & Bruce, A. (2017). Practical statistics for data scientists: 50 essential concepts. Sebastopol, CA: O'Reilly.
- Downey, A. B. (2014). Think stats (2nd ed.). Sebastopol, CA: O'Reilly.
- Downey, A. B. (2013). Think Bayes. Sebastopol, CA: O'Reilly.
- Reinhart, A. (2015). Statistics done wrong: The woefully complete guide. San Francisco, CA: No Starch Press.
- Wassermann, L. (2004). All of statistics: A concise course in statistical inference. New York, NY: Springer Science+Business Media.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input checked="" type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDSSPDS01







## 2. Semester

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# Object Oriented and Functional Programming with Python

Module Code: DLBDSOOFPP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

## Module Coordinator

Prof. Dr. Max Pumperla (Object oriented and functional programming in Python)

## Contributing Courses to Module

- Object oriented and functional programming in Python (DLBDSOOFPP01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Portfolio

### Split Exam

## Weight of Module

see curriculum

## Module Contents

This course introduces the students to the advanced programming concepts of object orientation and functional programming and how they are realized in the Python programming language.

**Learning Outcomes****Object oriented and functional programming in Python**

On successful completion, students will be able to

- explain basic notions in object-oriented programming such as functions and classes.
- understand object-oriented programming concepts and their relation to software design and engineering.
- describe advanced function concepts in Python.
- recognize important ideas from functional programming.
- recall important libraries for functional programming in Python.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Object oriented and functional programming in Python

Course Code: DLBDSOOFPP01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course builds upon basic knowledge of Python programming (Introduction to Programming with Python, DLBDSIPWP) and is concerned with the exposition of advanced Python programming concepts. To this end, important notions of object-oriented programming like classes and objects and pertaining design principles are outlined. Starting from an in-depth discussion of advanced features of Python functions, functional programming concepts and their implementation in Python are conveyed.

## Course Outcomes

On successful completion, students will be able to

- explain basic notions in object-oriented programming such as functions and classes.
- understand object-oriented programming concepts and their relation to software design and engineering.
- describe advanced function concepts in Python.
- recognize important ideas from functional programming.
- recall important libraries for functional programming in Python.

## Contents

- This course provides students with a thorough introduction to important notions and concepts from the domain of object-oriented programming such as classes, objects, abstraction, encapsulation, inheritance, polymorphism, composition, and delegation. Additionally, the functional programming paradigm and pertaining ideas like functions as first class objects, decorators, pure functions, immutability and higher order functions are conveyed. Pursuant to the portfolio course type, the aforementioned concepts and ideas are explored by hands-on programming projects.

**Literature****Compulsory Reading****Further Reading**

- Lott, S. F. (2018): Functional Python programming: Discover the power of functional programming, generator functions, lazy evaluation, the built-in itertools library, and monads. 2nd ed., Packt Publishing, Birmingham.
- Lutz, M. (2013): Learning Python. 5th ed., O'Reilly, Sebastopol, CA.
- Phillips, D. (2018): Python 3 object-oriented programming: Build robust and maintainable software with object-oriented design patterns in Python 3.8. 3rd ed., Packt Publishing, Birmingham.
- Ramalho, L. (2015): Fluent Python: Clear, concise, and effective programming. O'Reilly, Sebastopol, CA.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSOOFPP01

## Mathematics: Linear Algebra

Module Code: DLBDSMFLA

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Moustafa Nawito (Mathematics: Linear Algebra)

### Contributing Courses to Module

- Mathematics: Linear Algebra (DLBDSMFLA01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Matrix algebra
- Vector spaces
- Linear and affine transformations
- Analytical geometry
- Matrix decomposition

**Learning Outcomes****Mathematics: Linear Algebra**

On successful completion, students will be able to

- explain fundamental notions in the domain of linear equation systems.
- exemplify properties of vectors and vector spaces.
- summarize characteristics of linear and affine mappings.
- identify important relations in analytical geometry.
- utilize different methods for matrix decomposition.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Methods

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Mathematics: Linear Algebra

Course Code: DLBDSMFLA01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Linear algebra is a fundamental subject in mathematics. Its historical origin lies in the development of solution techniques for systems of linear equations arising from geometric problems. Numerous scientific and engineering applications can be solved using its methods. This course introduces the foundations of linear algebra and its basic notions like vectors and matrices. It then builds upon this foundation by introducing the derivation of solution techniques for problems in analytical geometry.

## Course Outcomes

On successful completion, students will be able to

- explain fundamental notions in the domain of linear equation systems.
- exemplify properties of vectors and vector spaces.
- summarize characteristics of linear and affine mappings.
- identify important relations in analytical geometry.
- utilize different methods for matrix decomposition.

## Contents

1. Fundamentals
  - 1.1 Systems of linear equations
  - 1.2 Matrices as compact representations of linear equations
  - 1.3 Matrix algebra
  - 1.4 Inverse and trace
2. Vector Spaces
  - 2.1 Definition
  - 2.2 Linear combination and linear dependence
  - 2.3 Base, span, and rank
3. Linear and affine mappings
  - 3.1 Matrix representations of linear mappings
  - 3.2 Image and kernel
  - 3.3 Affine spaces and sub-spaces
  - 3.4 Affine mappings

4. Analytical Geometry
  - 4.1 Norms
  - 4.2 Inner and dot product
  - 4.3 Orthogonal projections
  - 4.4 Rotations
  
5. Matrix Decomposition
  - 5.1 Determinant and trace
  - 5.2 Eigenvalues and eigenvectors
  - 5.3 Cholesky decomposition
  - 5.4 Eigenvalue decomposition and diagonalisation
  - 5.5 Singular value decomposition

**Literature****Compulsory Reading****Further Reading**

- Arfken, G./Weber, H. J./Harris, F. E. (2012): Mathematical methods for physicists. 7th ed., Academic Press, Cambridge, MA.
- Boas, M. L. (2006): Mathematical methods in the physical sciences. 3rd ed., Wiley, Hoboken, NJ.
- Deisenroth, M. P./Faisal, A./Ong C. S. (2019): Math for machine learning. (URL: <https://mml-book.com>).
- Riley, K. F./Hobson, M. P./Bence, S. J. (2006): Mathematical methods for physics and engineering. Cambridge University Press, Cambridge.
- Strang, G. (2016): Introduction to linear algebra, 5th ed., Wellesley-Cambridge Press, Wellesley, MA.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input checked="" type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSMFLA01



## Intercultural and Ethical Decision-Making

Module Code: DLBCSIDM

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Jürgen Matthias Seeler (Intercultural and Ethical Decision-Making)

### Contributing Courses to Module

- Intercultural and Ethical Decision-Making (DLBCSIDM01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Case Study

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Basics of Intercultural Competence
- Cultural Concepts
- Culture and Ethics
- Implications of Current Ethical Problems in the Area of Interculturality, Ethics, and Diversity
- Intercultural Learning and Working
- Case Studies for Cultural and Ethical Conflicts

**Learning Outcomes****Intercultural and Ethical Decision-Making**

On successful completion, students will be able to

- explain the most important terms in the areas of interculturality, diversity, and ethics.
- distinguish different explanatory patterns of culture.
- understand culture at different levels.
- plan processes of intercultural learning and working.
- understand the interdependencies of culture and ethics.
- independently work on a case study on intercultural competence.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Business Administration & Management

**Links to other Study Programs of IUBH**

All Bachelor Programs in the Business & Management fields

# Intercultural and Ethical Decision-Making

Course Code: DLBCSIDM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In this course, students acquire the necessary knowledge to understand intercultural competencies and current developments in the fields of diversity and ethics. Students will understand how to systematically plan and implement learning processes for the development of competences important in these areas. First, important terms are clarified and differentiated from each other, and cultural aspects are explained from different perspectives. In addition, students learn that cultural issues are relevant at different levels, for example, within a state, company, or other group. In this context, students also recognize the connection between ethics and culture with different interdependencies. On the basis of this knowledge, students are then familiarized with the different possibilities and potentials of intercultural and ethical learning and working. Practical cases are used to illustrate the importance of the relationships learned for today's work context in many companies. The students then work on a case study in which the acquired knowledge is systematically applied.

## Course Outcomes

On successful completion, students will be able to

- explain the most important terms in the areas of interculturality, diversity, and ethics.
- distinguish different explanatory patterns of culture.
- understand culture at different levels.
- plan processes of intercultural learning and working.
- understand the interdependencies of culture and ethics.
- independently work on a case study on intercultural competence.

## Contents

1. Basics of Intercultural and Ethical Competence to Act
  - 1.1 Subject Areas, Terms, and Definitions
  - 1.2 Relevance of Intercultural and Ethical Action
  - 1.3 Intercultural Action - Diversity, Globalization, Ethics
2. Cultural Concepts
  - 2.1 Hofstede's Cultural Dimensions
  - 2.2 Culture Differentiation According to Hall
  - 2.3 Locus of Control Concept to Rotter

3. Culture and Ethics
  - 3.1 Ethics - Basic Terms and Concepts
  - 3.2 Interdependence of Culture and Ethics
  - 3.3 Ethical Concepts in Different Regions of the World
4. Current Topics in the Area of Interculturality, Ethics, and Diversity
  - 4.1 Digital Ethics
  - 4.2 Equality and Equal Opportunities
  - 4.3 Social Diversity
5. Intercultural Learning and Working
  - 5.1 Acculturation
  - 5.2 Learning and Working in Intercultural Groups
  - 5.3 Strategies for Dealing with Cultural Conflicts
6. Case Studies for Cultural and Ethical Conflicts
  - 6.1 Case Study: Interculturality
  - 6.2 Case Study: Diversity
  - 6.3 Case Study: Interculturality and Ethics

## Literature

### Compulsory Reading

### Further Reading

- Emrich, C. (2011): Interkulturelles Management: Erfolgsfaktoren im globalen Business. Kohlhammer-Verlag, Stuttgart/Berlin/Köln.
- Erll, A./Gymnich, M. (2015): Uni-Wissen Interkulturelle Kompetenzen: Erfolgreich kommunizieren zwischen den Kulturen – Kernkompetenzen. 4. Auflage, Klett Lerntraining, Stuttgart.
- Eß, O. (2010): Das Andere lehren: Handbuch zur Lehre Interkultureller Handlungskompetenz. Waxmann Verlag, Münster.
- Hofstede, G./ Hofstede, G. J./Minkov, M. (2017): Lokales Denken, globales Handeln Interkulturelle Zusammenarbeit und globales Management. 6. Auflage, Beck, München.
- Leenen, W.R./Groß, A. (2018): Handbuch Methoden Interkultureller Bildung und Weiterbildung. Verlag Vandenhoeck & Ruprecht, Göttingen.
- Thomas, A. (2011): Interkulturelle Handlungskompetenz. Versiert, angemessen und erfolgreich im internationalen Geschäft. Gabler-Verlag, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Case Study
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Case Study

<b>Student Workload</b>					
<b>Self Study</b> 110 h	<b>Presence</b> 0 h	<b>Tutorial</b> 20 h	<b>Self Test</b> 20 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBCSIDM01

## Statistics - Inferential Statistics

Module Code: DLBDSSIS

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> DLBDSSPDS01	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

Dr. Stefan Stöckl (Statistics - Inferential Statistics)

### Contributing Courses to Module

- Statistics - Inferential Statistics (DLBDSSIS01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Point estimation
- Uncertainties
- Bayesian inference & non-parametric techniques
- Statistical testing
- Statistical decision theory

**Learning Outcomes****Statistics - Inferential Statistics**

On successful completion, students will be able to

- understand point estimation methods.
- apply maximum likelihood and ordinary least squares method to estimate parameters.
- comprehend the concept of statistical and systematic errors.
- employ error propagation methods.
- utilize Bayesian inference and non-parametric techniques.
- evaluate statistical tests.
- grasp the fundamentals of statistical decision theory.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Methods

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields



# Statistics - Inferential Statistics

Course Code: DLBDSSIS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSSPDS01

## Course Description

Statistical analysis and understanding are the foundations of data-driven methods and machine learning approaches. This course gives a thorough introduction to point estimators and discusses various techniques to estimate and optimize parameters. Special focus is given to a detailed discussion of both statistical and systematic uncertainties as well as propagation of uncertainties. Bayesian statistics is fundamental to data-driven approaches, and this course takes a close look at Bayesian techniques such as Bayesian parameter estimation and prior probability functions. Furthermore, this course gives an in-depth overview of statistical testing and decision theory, focusing on aspects such as A/B testing, hypothesis testing, p-values, and multiple testing which are fundamental to statistical analysis approaches in a broad range of practical applications.

## Course Outcomes

On successful completion, students will be able to

- understand point estimation methods.
- apply maximum likelihood and ordinary least squares method to estimate parameters.
- comprehend the concept of statistical and systematic errors.
- employ error propagation methods.
- utilize Bayesian inference and non-parametric techniques.
- evaluate statistical tests.
- grasp the fundamentals of statistical decision theory.

## Contents

1. Point Estimation
  - 1.1 Method of moments
  - 1.2 Sufficient statistics
  - 1.3 Maximum likelihood
  - 1.4 Ordinary least squares
  - 1.5 Resampling techniques
2. Uncertainties
  - 2.1 Statistical and systematic uncertainties
  - 2.2 Propagation of uncertainties

3. Bayesian Inference & Non-parametric Techniques
  - 3.1 Bayesian parameter estimation
  - 3.2 Prior probability functions
  - 3.3 Parzen windows
  - 3.4 K-nearest-neighbours
4. Statistical Testing
  - 4.1 A/B testing
  - 4.2 Hypothesis tests & test statistics
  - 4.3 P-values & confidence intervals
  - 4.4 Multiple testing
5. Statistical Decision Theory
  - 5.1 The risk function
  - 5.2 Maximum likelihood, Minimax, and Bayes
  - 5.3 Admissibility and Stein's paradox

**Literature****Compulsory Reading****Further Reading**

- Bruce, P., & Bruce, A. (2017). Practical statistics for data scientists: 50 essential concepts. Sebastopol, CA: O'Reilly.
- Downey, A. B. (2013). Think Bayes. Sebastopol, CA: O'Reilly.
- Downey, A. B. (2014). Think stats (2nd ed.). Sebastopol, CA: O'Reilly.
- Reinhart, A. (2015). Statistics done wrong: The woefully complete guide. San Francisco, CA: No Starch Press.
- Wassermann, L. (2004). All of statistics: A concise course in statistical inference. Cham: Springer.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input checked="" type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDSSIS01

# Cloud Computing

Module Code: DLBDSCC

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

Prof. Dr. Thomas Zöller (Cloud Computing)

## Contributing Courses to Module

- Cloud Computing (DLBDSCC01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- Cloud computing fundamentals
- Relevant enabling technologies for cloud computing
- Introduction to serverless computing
- Established cloud platforms
- Cloud offerings for data science and analytics

**Learning Outcomes****Cloud Computing**

On successful completion, students will be able to

- understand the fundamentals of cloud computing and cloud service models.
- recognize enabling technologies that underlie current cloud offerings.
- cite the principles of serverless computing.
- analyze characteristics of established cloud offerings.
- describe cloud options for data science and machine learning

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Cloud Computing

Course Code: DLBDSCC01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Many of the recent advances in data science, particularly machine learning and artificial intelligence, rely on comprehensive data storage and computing power. Cloud computing is one way of providing that power in a scalable way, without considerable upfront investment in hardware and software resources. This course introduces the area of cloud computing together with its enabling technologies. Moreover, the most cutting-edge advances like serverless computing and storage are illustrated. Finally, a thorough overview on popular cloud offerings, especially in regard to analytics capabilities, is given.

## Course Outcomes

On successful completion, students will be able to

- understand the fundamentals of cloud computing and cloud service models.
- recognize enabling technologies that underlie current cloud offerings.
- cite the principles of serverless computing.
- analyze characteristics of established cloud offerings.
- describe cloud options for data science and machine learning

## Contents

1. Introduction to Cloud Computing
  - 1.1 Fundamentals of Cloud computing
  - 1.2 Cloud Service Models
  - 1.3 Benefits and Risks
2. Enabling Technology
  - 2.1 Virtualization and Containerization
  - 2.2 Storage Technology
  - 2.3 Networks and RESTful Services
3. Serverless Computing
  - 3.1 Introduction to Serverless Computing
  - 3.2 Benefits
  - 3.3 Limitations

4. Established Cloud Platforms
  - 4.1 Google Cloud Platform
  - 4.2 Amazon Web Services
  - 4.3 Microsoft Azure
  
5. Data Science in the Cloud
  - 5.1 Google Data Science and Machine Learning Services
  - 5.2 Amazon Web Services Data Science and Machine Learning Services
  - 5.3 Microsoft Azure Data Science and Machine Learning Services

## Literature

### Compulsory Reading

#### Further Reading

- Chapin, J., & Roberts, M. (2017). What is serverless? Sebastopol, CA: O'Reilly Media.
- Goessling, S., & Jackson, K. L. (2018). Architecting cloud computing solutions. Birmingham: Packt Publishing.
- Kavis, M. J. (2014). Architecting the cloud: Design decisions for cloud computing service models (SaaS, PaaS, and IaaS). Hoboken, NJ: Wiley.
- Mahmood, Z., Puttini, R., & Erl, T. (2013). Cloud computing: Concepts, technology & architecture. Boston, MA: Prentice Hall.
- Rafaels, R. (2018). Cloud computing (2nd ed.). Scotts Valley, CA: CreateSpace Independent Publishing Platform.
- Sehgal, N. K., & Bhatt, P. C. P. (2018). Cloud computing: Concepts and practices. Cham: Springer.
- Zonooz, P. Farr, E., Arora, K., & Laszewski, T. (2018). Cloud native architectures. Birmingham: Packt Publishing.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDSCC01

## Cloud Programming

Module Code: DLBSEPCP\_E

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	None	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Marian Benner-Wickner (Cloud Programming)

### Contributing Courses to Module

- Cloud Programming (DLBSEPCP01\_E)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Portfolio

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

The students employ and polish their knowledge of distributed computer systems so as to be able to plan, create, test, and document a scalable service deployed in the cloud. The module is focused on a practical realization and its documentation: Through the testable deployment, students guarantee that their project can be realized and has requirements of a cloud system, through the documentation, the student demonstrates the qualities of the realization and of its creation process.

**Learning Outcomes****Cloud Programming**

On successful completion, students will be able to

- associate characteristics of a cloud infrastructure as discussed in business with concrete implications for the machines deployed in the cloud.
- create a plan for a chosen cloud infrastructure provider and measure the achievement of this plan.
- specify by means of scripts, programs, documented web-platform usage, how the elements of a cloud service are created and measured.
- describe the risks, the protection measures, and the reaction measures of a cloud-service.
- demonstrate a running cloud-service created by the student and allow it to be tested in all its possible usage dimensions.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Computer Science & Software Development

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Cloud Programming

Course Code: DLBSEPCP01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	None

## Course Description

The usage of commodity computing in the form of a service offered over a network interface is a major technical aspect of services made by IT organizations: The services function within a server environment and the ubiquity of the network make the service reachable from everywhere with high availability guarantees and flexible scalability. The course aims at a documented realization of a cloud service which displays all the attributes of a cloud service. In doing so the students employ and deepen their knowledge of distributed computer systems so as to be able to plan, create, deploy, test, measure, and document a scalable service in the cloud.

## Course Outcomes

On successful completion, students will be able to

- associate characteristics of a cloud infrastructure as discussed in business with concrete implications for the machines deployed in the cloud.
- create a plan for a chosen cloud infrastructure provider and measure the achievement of this plan.
- specify by means of scripts, programs, documented web-platform usage, how the elements of a cloud service are created and measured.
- describe the risks, the protection measures, and the reaction measures of a cloud-service.
- demonstrate a running cloud-service created by the student and allow it to be tested in all its possible usage dimensions.

## Contents

- In this course, students create a cloud service which demonstrates the core aspects of cloud service programming by an explicit documentation and by a measurable concrete realization. To do so, they choose a PaaS cloud service hoster, set-up a service, describe its interfaces (API) and how the core characteristics of cloud services are achieved:
  - Horizontal or vertical scalability: How the service can be enlarged or diminished in its usage of resources in order to react to variation to the demand.
  - High-availability: What guarantees a failover in case a component of the service is made inoperable and what kind of degradation can happen.
  - Measurability: How the usage of resources is measured and how these measures can allow a proactive planning.
  - Orchestration and provisioning: How the service is deployed and changes in its resources allocations are performed as needed by the usage of the service.

The cloud service should be testable and demonstratable by external users; a plan how to test it should be part of the documentation including the dimensions of the usage as well as the API definitions of the service. The service should fulfill a recognizable business need and be documented by an API definition and a user-interface for its usage runnable on any platform that has access to the internet. Being a service on the internet, its security restrictions should be accessible and understandable. Based on these ingredients, the students realize a work in the form of software artifacts in a versioning system and a human readable documentation of the realization and its process. The realization and its documentation should follow current trends in cloud engineering.

**Literature****Compulsory Reading****Further Reading**

- Johnston, C., Advanced Platform Development with Kubernetes. Springer, <https://doi-org.pxz.iubh.de:8443/10.1007/978-1-4842-5611-4>
- Jonas, E., Schleier-Smith, J., Sreekanti, V., Tsai, C.-c., Khandelwal, A., Pu, Q., Shankar, V., Carreira, J., Krauth, K., Jayant Yadwadkar, N., Gonzalez, J., Popa, R.A., Stoica, I., Patterson, D.: Cloud Programming Simplified: A Berkeley View on Serverless Computing. CoRR abs/1902.03383 (2019) <https://arxiv.org/abs/1902.03383>
- Talia, D., A view of programming scalable data analysis: from clouds to exascale, Journal of Cloud Computing: Advances, Systems and Applications (2019-02-01). <https://doi.org/10.1186/s13677-019-0127-x>
- Ponelat, J.S., Rosenstock, L.L., Designing APIs with Swagger and OpenAPI, Manning Publications, ISBN 9781617296284, <https://www.manning.com/books/designing-apis-with-swagger-and-openapi>

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBSEPCP01\_E







# 3. Semester

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## Machine Learning - Supervised Learning

Module Code: DLBDSMLS

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> DLBDSMFC01, DLBDSMFLA01, DLBDSSPDS01, DLBDSSIS01	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

Prof. Dr. Christian Müller-Kett (Machine Learning - Supervised Learning)

### Contributing Courses to Module

- Machine Learning - Supervised Learning (DLBDSMLS01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Types of machine learning
- Classification
- Regression
- Support vector machines
- Decision trees

**Learning Outcomes****Machine Learning - Supervised Learning**

On successful completion, students will be able to

- remember central notions and paradigms of machine learning.
- describe the key ideas of regression and pertaining regularization methods.
- know basic classification techniques.
- explain tree structured machine learning models.
- understand support vector machines and the related kernel approach.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Machine Learning - Supervised Learning

Course Code: DLBDSMLSL01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSMFC01, DLBDSMFLA01, DLBDSSPDS01, DLBDSSIS01

## Course Description

This course provides a first introduction to the field of machine learning with a focus on supervised learning (i.e., learning from labeled data), where the most commonly used models in regression and classification are being introduced. Moreover, the course provides an introduction to the concepts of large margin classifiers and tree structured models.

## Course Outcomes

On successful completion, students will be able to

- remember central notions and paradigms of machine learning.
- describe the key ideas of regression and pertaining regularization methods.
- know basic classification techniques.
- explain tree structured machine learning models.
- understand support vector machines and the related kernel approach.

## Contents

1. Introduction to Machine Learning
  - 1.1 Pattern recognition systems
  - 1.2 The machine learning design cycle
  - 1.3 Technical notions of learning and adaptation
  - 1.4 Under- and overfitting
2. Regression
  - 2.1 Linear regression
  - 2.2 Lasso- and ridge Regularization
  - 2.3 Generalized linear models
  - 2.4 Logistic regression
3. Basic Classification Techniques
  - 3.1 K-nearest neighbour
  - 3.2 Naïve Bayes

4. Support Vector Machines
  - 4.1 Large margin classification
  - 4.2 The kernel trick
5. Decision & Regression Trees
  - 5.1 Decision & regression trees
  - 5.2 Random forest
  - 5.3 Gradient boosting

## Literature

### Compulsory Reading

### Further Reading

- Bishop, C. M. (2011). Pattern recognition and machine learning. New York, NY: Springer.
- Grus, J. (2019). Data science from scratch: First principles with Python (2nd ed.). Sebastopol, CA: O'Reilly.
- Muller, A. C., & Guido, S. (2016). Introduction to machine learning with Python. Sebastopol, CA: O'Reilly.
- Ozdemir, S., & Susarla, D. (2018). Feature engineering made easy: Identify unique features from your dataset in order to build powerful machine learning systems . Birmingham: Packt Publishing.
- VanderPlas, J. (2017). Python data science handbook. Sebastopol, CA: O'Reilly Publishing.
- Webb, A. R., & Copsey, K. D. (2011). Statistical pattern recognition (3rd ed.). Hoboken, NJ: Wiley.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSMLSL01

## Machine Learning - Unsupervised Learning and Feature Engineering

Module Code: DLBDSMLUSL

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	DLBDSMFC01, DLBDSMFLA01, DLBDSSPDS01, DLBDSSIS01	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Christian Müller-Kett (Machine Learning - Unsupervised Learning and Feature Engineering)

### Contributing Courses to Module

- Machine Learning - Unsupervised Learning and Feature Engineering (DLBDSMLUSL01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Case Study

#### Split Exam

### Weight of Module

see curriculum

<p><b>Module Contents</b></p> <ul style="list-style-type: none"> <li>▪ Unsupervised machine learning</li> <li>▪ Clustering</li> <li>▪ Dimensionality reduction</li> <li>▪ Manifold learning</li> <li>▪ Feature engineering</li> <li>▪ Feature selection</li> <li>▪ Automation of feature generation and selection</li> </ul>	
<p><b>Learning Outcomes</b></p> <p><b>Machine Learning - Unsupervised Learning and Feature Engineering</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ explain the notions of unsupervised learning and feature selection.</li> <li>▪ recall commonly-applied clustering models.</li> <li>▪ understand the concept and utility of dimensionality reduction and manifold learning.</li> <li>▪ describe effective approaches to feature engineering.</li> <li>▪ discuss the methods of automatic feature generation and selection.</li> </ul>	
<p><b>Links to other Modules within the Study Program</b></p> <p>This module is similar to other modules in the fields of Data Science &amp; Artificial Intelligence</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All Bachelor Programmes in the IT &amp; Technology fields</p>

# Machine Learning - Unsupervised Learning and Feature Engineering

Course Code: DLBDSMLUSL01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSMFC01, DLBDSMFLA01, DLBDSSPDS01, DLBDSSIS01

## Course Description

This course is concerned with the tools and techniques for unsupervised learning and feature engineering. Unsupervised learning denotes machine learning approaches that can be applied without label information. As such, the aim is to extract patterns or statistical regularities in data, and finding good features is key for the successful application of machine learning models. Therefore, having a solid set of approaches and tools for this task is of crucial importance for any data scientist. This course introduces the most relevant methods and shows how unsupervised learning techniques can be utilized to find robust and meaningful features.

## Course Outcomes

On successful completion, students will be able to

- explain the notions of unsupervised learning and feature selection.
- recall commonly-applied clustering models.
- understand the concept and utility of dimensionality reduction and manifold learning.
- describe effective approaches to feature engineering.
- discuss the methods of automatic feature generation and selection.

## Contents

1. Introduction to Unsupervised Machine Learning and Feature Engineering
  - 1.1 Unsupervised machine learning
  - 1.2 Feature engineering
2. Clustering
  - 2.1 K-Means
  - 2.2 Gaussian mixture model clustering
  - 2.3 Hierarchical clustering

3. Dimensionality Reduction
  - 3.1 Principal component analysis
  - 3.2 Multi-dimensional scaling
  - 3.3 Locally linear embedding
4. Feature Engineering
  - 4.1 Numerical features
  - 4.2 Categorical features
  - 4.3 Text features
5. Feature Selection
  - 5.1 Feature importance
  - 5.2 Feature variance
  - 5.3 Correlation matrix
  - 5.4 Recursive feature selection
6. Automated Feature Generation
  - 6.1 Automated feature generation
  - 6.2 Feature engineering versus deep learning

## Literature

### Compulsory Reading

### Further Reading

- Bishop, C. M. (2011). Pattern recognition and machine learning. New York, NY: Springer.
- Grus, J. (2019). Data science from scratch: First principles with Python (2nd ed.). Sebastopol, CA: O'Reilly.
- Muller, A. C., & Guido, S. (2016). Introduction to machine learning with Python. Sebastopol, CA: O'Reilly.
- Ozdemir, S., & Susarla, D. (2018). Feature engineering made easy: Identify unique features from your dataset in order to build powerful machine learning systems. Birmingham: Packt Publishing.
- VanderPlas, J. (2017). Python data science handbook. Sebastopol, CA: O'Reilly Publishing.
- Webb, A. R., & Copsey, K. D. (2011). Statistical pattern recognition (3rd ed.). Hoboken, NJ: Wiley.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Case Study
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Case Study

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
110 h	0 h	20 h	20 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSMLUSL01



# Neural Nets and Deep Learning

Module Code: DLBDSNNDL

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> DLBDSMLSL01, DLBDSMLUSL01	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

N.N. (Neural Nets and Deep Learning)

## Contributing Courses to Module

- Neural Nets and Deep Learning (DLBDSNNDL01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Oral Assignment

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- Introduction to neural networks
- Feed-forward networks
- Avoiding overtraining
- Convolutional neural networks
- Recurrent neural networks

**Learning Outcomes**

**Neural Nets and Deep Learning**

On successful completion, students will be able to

- understand the fundamental building blocks of neural networks.
- identify different network training approaches.
- create feed-forward neural networks.
- analyze network training and how to avoid overtraining.
- apply advanced network concepts to create convolutional and recurrent neural networks.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Neural Nets and Deep Learning

Course Code: DLBDSNNDL01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSMLSL01, DLBDSMLUSL01

## Course Description

Neural networks and deep learning approaches have revolutionized the fields of data science and artificial intelligence in recent years, and applications built on these techniques have reached or surpassed human performance in many specialized applications. After a short review of the origins of neural networks and deep learning, this course discusses in detail how feed-forward networks are set up and trained. Special focus is given on how to avoid overtraining in neural networks. In addition to feed-forward neural networks, this course covers additional common network architectures such as convolutional and recurrent neural networks.

## Course Outcomes

On successful completion, students will be able to

- understand the fundamental building blocks of neural networks.
- identify different network training approaches.
- create feed-forward neural networks.
- analyze network training and how to avoid overtraining.
- apply advanced network concepts to create convolutional and recurrent neural networks.

## Contents

1. Introduction to Neural Networks
  - 1.1 The biological brain
  - 1.2 Building blocks of neural networks
  - 1.3 Deep versus shallow networks
  - 1.4 Supervised learning
  - 1.5 Reinforcement learning
2. Feed-forward Networks
  - 2.1 Architecture and weight initialization
  - 2.2 Cost functions
  - 2.3 Backpropagation and gradient descent
  - 2.4 Batch normalization

3. Overtraining Avoidance
  - 3.1 What is overtraining?
  - 3.2 Early stopping
  - 3.3 L1 and L2 regularization
  - 3.4 Dropout
  - 3.5 Weight pruning
4. Convolutional Neural Networks
  - 4.1 Motivation and applications
  - 4.2 Convolution and image filtering
  - 4.3 CNN architecture
  - 4.4 Popular convolutional networks
5. Recurrent Neural Networks
  - 5.1 Recurrent neurons
  - 5.2 Memory cells
  - 5.3 LSTMs
  - 5.4 Training RNNs: Unrolling through time

## Literature

### Compulsory Reading

### Further Reading

- Chollet, F. (2017). Deep learning with Python  
Shelter Island, NY: Manning.
- Efron, B., & Hastie, T. (2016). Computer age statistical inference  
Cambridge: Cambridge University Press.
- Geron, A. (2017). Hands-on machine learning with Scikit-Learn and TensorFlow  
Sebastopol, CA: O'Reilly Publishing.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning  
Boston, MA: MIT Press.
- Grus, J. (2019). Data science from scratch: First principles with Python. Sebastopol, CA: O'Reilly Publishing.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Oral Assignment

<b>Student Workload</b>					
<b>Self Study</b> 110 h	<b>Presence</b> 0 h	<b>Tutorial</b> 20 h	<b>Self Test</b> 20 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDSNNDL01

# Introduction to Computer Vision

Module Code: DLBAICV

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	None	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

N.N. (Introduction to Computer Vision)

## Contributing Courses to Module

- Introduction to Computer Vision (DLBAICV01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- Vision Fundamentals
- Image Filtering
- Low-Level Vision
- High-Level Vision
- Video

**Learning Outcomes****Introduction to Computer Vision**

On successful completion, students will be able to

- remember important facts about image acquisition both in humans as well as technical systems.
- describe the importance of filtering in image processing and its practical application.
- know about the role and function of lower-level features such as edges or salient points in vision processing.
- explain how Deep Learning methods are successfully applied in high-level vision tasks.
- understand the particularities of video processing and know how to solve common problems related to the interpretation of video material.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields



# Introduction to Computer Vision

Course Code: DLBAICV01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	None

## Course Description

This course aims at laying the foundation in the understanding of Computer Vision. To this end, it starts with an introduction of the image acquisition process both from a biological as well as a technical perspective. Building upon that, the importance of filtering in image processing is explained and the necessary conceptual background is laid out. This enables the subsequent presentation of how crucial low-level features are generated from the raw image material. From there, the exposition moves on to describing current approaches to relevant high-level vision problems such as object recognition or image classification. Finally, the processing of video information is treated together with an exposition on modern approaches to solving salient Computer Vision tasks in this setting.

## Course Outcomes

On successful completion, students will be able to

- remember important facts about image acquisition both in humans as well as technical systems.
- describe the importance of filtering in image processing and its practical application.
- know about the role and function of lower-level features such as edges or salient points in vision processing.
- explain how Deep Learning methods are successfully applied in high-level vision tasks.
- understand the particularities of video processing and know how to solve common problems related to the interpretation of video material.

## Contents

1. Vision Fundamentals
  - 1.1 The Human Visual System
  - 1.2 Pinhole and Lens Cameras
  - 1.3 Image Sensors
2. Image Filtering
  - 2.1 Linear Shift Invariant Systems, Convolutions and the Point Spread Function
  - 2.2 Fourier Transform and Spatial Frequency
  - 2.3 Common Image Filters (Gaussian Smoothing, Median, Mode Filters, Rank Order)

3. Low-Level Vision
  - 3.1 Blobs
  - 3.2 Edges and Lines
  - 3.3 Corners and Points of Interest
4. High Level Vision
  - 4.1 Image Classification
  - 4.2 Semantic Segmentation
  - 4.3 Object Recognition
5. Video
  - 5.1 Fundamentals of Video Data, Motion and Optical Flow
  - 5.2 Object Tracking
  - 5.3 Action Classification

**Literature****Compulsory Reading****Further Reading**

- Davies, E.R. (2012). Computer and Machine Vision. 4th edition. Academic Press. London, Oxford, Boston, New York, and San Diego.
- Shanmugamani, R. (2018): Deep Learning for Computer Vision. Packt Publishing. Birmingham, UK.
- Szeliski, R. (2010) Computer Vision - Algorithms and Applications, Springer, Heidelberg.
- Fisher, R. B., Breckon, T. P., Dawson-Howe, K., Fitzgibbon, A., Robertson, C., Trucco, E., & Williams, C. K. I. (2016). Dictionary of computer vision and image processing. Chichester: John Wiley & Sons.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBAIICV01

## Project: Computer Vision

Module Code: DLBAIPCV

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> None	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Project: Computer Vision)

### Contributing Courses to Module

- Project: Computer Vision (DLBAIPCV01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Project Report

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

In this project course the students work out a practical implementation of a Computer Vision use case.

**Learning Outcomes**

**Project: Computer Vision**

On successful completion, students will be able to

- apply the concepts covered in the preceding AI and Computer Vision courses to build a running Computer Vision system.
- explain the design choices made in the selection of the employed model or method and its implementation.
- transfer acquired theoretical knowledge to real case studies.
- translate the learned theories into the practice of Computer Vision system building.
- critically evaluate the resulting model's or system's performance.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Project: Computer Vision

Course Code: DLBAIPCV01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	None

## Course Description

In the course “Project Computer Vision” students choose a project task from a selection of options outlined in the pertaining project report guideline. The goal is to prototypically implement a Computer Vision system in a suitable development environment using apposite tools and code libraries. The choice of approach, the implemented system or software and the resulting performance on the task are to be reasoned about, explained, and documented in a project report. To this end, students make practical use of the methodological knowledge acquired in the previous courses by applying them to relevant real-world problems.

## Course Outcomes

On successful completion, students will be able to

- apply the concepts covered in the preceding AI and Computer Vision courses to build a running Computer Vision system.
- explain the design choices made in the selection of the employed model or method and its implementation.
- transfer acquired theoretical knowledge to real case studies.
- translate the learned theories into the practice of Computer Vision system building.
- critically evaluate the resulting model’s or system’s performance.

## Contents

- In this project course the students work out a practical implementation of a Computer Vision use case choosing from a selection given in the complementary project report guideline. All relevant artifacts like use case evaluation, chosen implementation method, code, and outcomes are to be documented in the form of a written project report.

**Literature****Compulsory Reading****Further Reading**

- Demmagd, K., Oliver, A., Oostendopr, N., Scott, K. (2012): Practical Computer Vision with SimpleCV. O'Reilly Media Inc., Beijing, Cambridge, Farnham, Köln, Sabastopol, Tokyo.
- Solem, J.E. (2012): Programming Computer Vision with Python. O'Reilly Media Inc., Beijing, Cambridge, Farnham, Köln, Sabastopol, Tokyo.
- Martinez, J. (2021): TensorFlow 2.0 Computer Vision Cookbook. Packt Publishing, Birmingham.
- Ranjan, S., and Senthamilarasu, S. (2020): Applied Deep Learning and Computer Vision for Self-Driving Cars. Packt Publishing, Birmingham.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBAIPCV01

# Introduction to Reinforcement Learning

Module Code: DLBAIIRL

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> DLBDSNNDL01	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

N.N. (Introduction to Reinforcement Learning)

## Contributing Courses to Module

- Introduction to Reinforcement Learning (DLBAIIRL01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- Introduction to Reinforcement Learning
- Sequential Decision Process
- Dynamic Programming
- Temporal-Difference Learning
- Deep Reinforcement Learning

**Learning Outcomes****Introduction to Reinforcement Learning**

On successful completion, students will be able to

- remember the concepts of reinforcement learning.
- understand sequential and Markov decision processes.
- apply Q-Learning methods to reinforcement learning problems.
- apply neural networks to deep reinforcement learning approaches.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Introduction to Reinforcement Learning

Course Code: DLBAIIRL01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSNNDL01

## Course Description

Reinforcement learning allows computers to derive problem-solving strategies without being explicitly programmed for the specific task, similar to the way humans and animals learn. After a general introduction to the field of reinforcement learning, the course discusses sequential decision processes and dynamic programming in detail. These concepts are the foundation upon which most of the theory of reinforcement learning is built and is crucial to the further understanding of the topic. The course explains temporal-difference learning as a classical reinforcement learning technique and highlights two of the most important algorithms: Q-learning and SARSA, as well as understanding the tradeoff between exploration and exploitation. Afterwards, the course turns to modern reinforcement learning approaches with deep neural networks, including a detailed discussion of how to optimize the training of deep reinforcement learning techniques as well as discussing notable applications and examples.

## Course Outcomes

On successful completion, students will be able to

- remember the concepts of reinforcement learning.
- understand sequential and Markov decision processes.
- apply Q-Learning methods to reinforcement learning problems.
- apply neural networks to deep reinforcement learning approaches.

## Contents

1. Introduction to Reinforcement Learning
  - 1.1 Objectives of Reinforcement Learning
  - 1.2 Components of Reinforcement Learning Systems
  - 1.3 Reinforcement Learning versus Supervised and Unsupervised Machine Learning
2. Sequential Decision Process
  - 2.1 Introduction to Sequential Decision Processes
  - 2.2 Observations, Cost and Rewards
  - 2.3 Markov Decision Processes

3. Dynamic Programming
  - 3.1 Policies and Actions
  - 3.2 Value Functions
  - 3.3 Policy and Value Iteration
  - 3.4 Bellman's Equation
4. Reinforcement Learning Algorithms and their Properties
  - 4.1 Temporal-Difference Learning and Q-Factors
  - 4.2 Exploration versus Exploitation
  - 4.3 On-Policy Learning: SARSA
  - 4.4 Off-Policy Learning: Q-Learning
5. Deep Reinforcement Learning
  - 5.1 Neural Networks in Q-Learning
  - 5.2 Optimizing Deep Reinforcement Learning
  - 5.3 Applications and Examples

#### Literature

#### Compulsory Reading

#### Further Reading

- Geron, A. (2019). Hands-on machine learning with Scikit-Learn and TensorFlow. 2nd Edition. Boston, MA: O'Reilly Publishing.
- Kolobov, A., & Mausam. (2012). Planning with Markov decision processes: An AI perspective. San Rafael, CA: Morgan & Claypool.
- Powell, W. (2011). Approximate Dynamic Programming (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Sutton, R., & Barto, A. (2018). Reinforcement learning: An introduction (2nd ed.). Boston, MA: MIT Press.
- Szepesvári, C. (2010). Algorithms for reinforcement learning. San Rafael, CA: Morgan & Claypool.
- Wiering, M., & Otterlo, M. (2012). Reinforcement learning: State of the art. Berlin: Springer.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBAIIRL01







# 4. Semester

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## Introduction to NLP

Module Code: DLBAIINLP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Ulrich Kerzel (Introduction to NLP)

### Contributing Courses to Module

- Introduction to NLP (DLBAIINLP01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Introduction to NLP
- Important methods in NLP
- Relevant Applications in NLP
- Challenges in NLP

**Learning Outcomes****Introduction to NLP**

On successful completion, students will be able to

- get a good overview of the topic NLP.
- name important challenges in NLP.
- apply common algorithms and methods to address NLP problems.
- understand common use-case scenarios in which NLP techniques are applied.
- analyze benefits and shortcomings of various NLP algorithms.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the field of IT & Technology

# Introduction to NLP

Course Code: DLBAIINLP01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In this course, traditional and state-of-the-art approaches to Natural Language Processing will be taught. To achieve this goal, techniques, challenges, and solution approaches are presented with a comprehensive overview of related topics and techniques. Additionally, it will be shown how NLP can be used successfully in different application scenarios - both theoretically and with practical examples.

## Course Outcomes

On successful completion, students will be able to

- get a good overview of the topic NLP.
- name important challenges in NLP.
- apply common algorithms and methods to address NLP problems.
- understand common use-case scenarios in which NLP techniques are applied.
- analyze benefits and shortcomings of various NLP algorithms.

## Contents

1. Basic Terms and Concepts
  - 1.1 What is NLP?
  - 1.2 Syntax
  - 1.3 Semantics
  - 1.4 Prosodics
  - 1.5 Grammar
2. Language and Speech
  - 2.1 Human Vocal Apparatus
  - 2.2 Speech Production
  - 2.3 Phonetics
3. Challenges in NLP
  - 3.1 Data for NLP
  - 3.2 Evaluation of NLP Systems
  - 3.3 Domain Challenges
  - 3.4 Multilingual Application

4. Techniques
  - 4.1 Rules vs. Statistics
  - 4.2 Regular Expressions
  - 4.3 N-Grams
  - 4.4 Word Vectors
  - 4.5 NLP Models
5. Application Scenarios
  - 5.1 Speech Recognition
  - 5.2 Speech Synthesis
  - 5.3 Machine Translation
  - 5.4 Information Extraction
  - 5.5 Chatbot
  - 5.6 NLP with Python

#### Literature

#### Compulsory Reading

#### Further Reading

- Bird S., Klein, E., & Loper, E. (2009): Natural language processing with Python. O'Reilly, Sebastopol.
- Kamath , U., Liu, J., & Whitaker, J. (2019): Deep Learning for NLP and Speech Recognition: Practical NLP, Speech, and Deep Learning using Python-based Open Source Tools. Springer.
- Jurafsky, D., & Martin, J. H. (2020): Speech and language processing (3rd ed.). PrenticeHall, New Jersey. <https://web.stanford.edu/~jurafsky/slp3>



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBAIINLP01

## Project: NLP

Module Code: DLBAIPNLP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Ulrich Kerzel (Project: NLP)

### Contributing Courses to Module

- Project: NLP (DLBAIPNLP01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Project Report

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

In this module students learn to put their theoretical knowledge in the field of NLP into practice. In this process, students learn to proceed analytically in order to find the optimal solution for a specific NLP task.

**Learning Outcomes****Project: NLP**

On successful completion, students will be able to

- apply knowledge of NLP methods to practical problems.
- evaluate and apply different methods, algorithms, and approaches to solve a given problem, taking into account its constraints.
- recognize the benefits and shortcomings of options and decisions.
- implement real-world NLP applications.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology field

## Project: NLP

Course Code: DLBAIPNLP01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

This course gives students the opportunity to apply their knowledge in NLP to a real implementation task. This requires finding an appropriate solution for a given task and associated constraints. Methodological and algorithmic choices must be appropriately evaluated to find the optimal way. The investigated solution will be implemented as executable software which promotes the students' programming skills.

### Course Outcomes

On successful completion, students will be able to

- apply knowledge of NLP methods to practical problems.
- evaluate and apply different methods, algorithms, and approaches to solve a given problem, taking into account its constraints.
- recognize the benefits and shortcomings of options and decisions.
- implement real-world NLP applications.

### Contents

- In this course, students put into practice the NLP knowledge acquired in previous courses by implementing a project of their choice.

### Literature

#### Compulsory Reading

#### Further Reading

- Bird S., Klein, E., & Loper, E. (2009): Natural language processing with Python. O'Reilly, Sebastopol.
- Jurafsky, D., & Martin, J. H. (2020): Speech and language processing (3rd ed.). PrenticeHall, New Jersey. <https://web.stanford.edu/~jurafsky/slp3>
- Kamath, U., Liu, J., & Whitaker, J. (2019): Deep Learning for NLP and Speech Recognition: Practical NLP, Speech, and Deep Learning using Python-based Open Source Tools. Springer.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Introduction to Data Protection and Cyber Security

Module Code: DLBCSIDPITS

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Ralf Kneuper (Introduction to Data Protection and Cyber Security)

### Contributing Courses to Module

- Introduction to Data Protection and Cyber Security (DLBCSIDPITS01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Fundamentals of IT Security
- Data Protection
- IT Security Management
- Network and Communication Security

**Learning Outcomes****Introduction to Data Protection and Cyber Security**

On successful completion, students will be able to

- explain the terms and concepts of IT security and know the typical procedures and techniques which exist in each area.
- cite the legal regulations on data protection and explain their implementation.
- discuss in-depth IT security management and suitable measures for implementation.
- use their overview knowledge of activities and strategies for IT security in software and system development.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field(s) of Computer Science & Software Development.

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology field(s).



# Introduction to Data Protection and Cyber Security

Course Code: DLBCSIDPITS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In this course, the students are familiarized with important concepts from the field of IT security. Basic terms are introduced and discussed, and typical application fields, areas of IT security application, and typical procedures and techniques are introduced and described.

## Course Outcomes

On successful completion, students will be able to

- explain the terms and concepts of IT security and know the typical procedures and techniques which exist in each area.
- cite the legal regulations on data protection and explain their implementation.
- discuss in-depth IT security management and suitable measures for implementation.
- use their overview knowledge of activities and strategies for IT security in software and system development.

## Contents

1. Fundamentals of Data Protection and IT Security
  - 1.1 Conceptual Bases, Protection Goals
  - 1.2 Attacks and Threats
  - 1.3 Security Strategy
  - 1.4 Legal Regulations (IT Security Law, etc.)
2. Data Protection
  - 2.1 Data Protection as a Personal Right
  - 2.2 Basic Principles of Data Protection (Data Economy, Consent, etc.)
  - 2.3 Federal Data Protection Act
  - 2.4 EU General Data Protection Regulation (GDPR)
  - 2.5 Further International Regulations on Data Protection (EU, USA)
  - 2.6 Cross-Border Data Flow, e.g., in Cloud Computing
  - 2.7 Data Protection in Everyday Life (Search Engines, Anonymous Surfing, Social Networks, Use of Mobile Devices and Data Carriers, etc.)

3.	Basic Functions of IT Security and Their Implementation
3.1	Identification and Authentication (Knowledge/Biometrics)
3.2	Rights Management
3.3	Rights Check
3.4	Preservation of Evidence
3.5	Reprocessing
3.6	Guarantee of Functionality
4.	IT Security Management
4.1	IT Basic Protection (Basic Protection Catalogues, Protection Needs Analysis, etc.)
4.2	Series of Standards ISO 2700x
5.	IT Security Management in Everyday Life
5.1	Password Management
5.2	Data Backup
5.3	Email Security
5.4	Protection Against Viruses and Other Pests
5.5	Protection Against Social Engineering Attacks
6.	Network and Communication Security
6.1	Firewall Technology
6.2	Network Separation
6.3	Security in WLAN, Mobile Networks (UMTS/LTE), Bluetooth, and NFC
7.	IT Security in the Development of Software and Systems
7.1	Protection of the Development Environment
7.2	Secure Development (Protection Against SQL Injection, XSS, Filtering of Input Data)
7.3	Common Criteria

<b>Literature</b>
<b>Compulsory Reading</b>
<b>Further Reading</b>
<ul style="list-style-type: none"> <li>▪ Eckert, C. (2014): IT-Sicherheit. Konzepte – Verfahren – Protokolle. 9. Auflage, De Gruyter, München.</li> <li>▪ Poguntke, W. (2013): Basiswissen IT-Sicherheit. Das Wichtigste für den Schutz von Systemen &amp; Daten. 3. Auflage, W3l, Dortmund.</li> <li>▪ Witt, B. C. (2010): Datenschutz kompakt und verständlich. 2. Auflage, Vieweg+Teubner, Wiesbaden.</li> </ul>

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBCSIDPITS01

# Data Science Software Engineering

Module Code: DLBDSDSSE

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> DLBDSIPWP01 or DLBDSIPWP01_D; DLBDSOOFPP01 or IOBP01	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

Prof. Dr. Max Pumperla (Data Science Software Engineering)

## Contributing Courses to Module

- Data Science Software Engineering (DLBDSDSSE01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- Traditional project management
- Agile project management
- Testing
- Software development paradigms
- From model to production

**Learning Outcomes****Data Science Software Engineering**

On successful completion, students will be able to

- understand the concept of project management approaches.
- apply agile approaches in software development.
- create automated software tests.
- understand various software development paradigms.
- evaluate the necessary steps to bring models into a production environment.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Data Science Software Engineering

Course Code: DLBDSSE01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSIPWP01 or DLBDSIPWP01_D; DLBDSOOFPP01 or IOBP01

## Course Description

A core part of data science is creating value from data. This means not only the creation of sophisticated predictive models but also the development of these models according to modern software development principles. This course gives a detailed overview of the relevant methods and paradigms which data scientists need to know in order to develop enterprise-grade models. This course discusses traditional and agile project management techniques, highlighting both the Kanban and Scrum approaches. It explores relevant software development paradigms such as test-driven development, pair programming, mob programming, and extreme programming. Special focus is given to the topic of testing and the consideration of how to bring a model into a production environment.

## Course Outcomes

On successful completion, students will be able to

- understand the concept of project management approaches.
- apply agile approaches in software development.
- create automated software tests.
- understand various software development paradigms.
- evaluate the necessary steps to bring models into a production environment.

## Contents

1. Traditional Project Management
  - 1.1 Requirements engineering
  - 1.2 Waterfall model
  - 1.3 Rational unified process
2. Agile Project Management
  - 2.1 Criticism of the waterfall model
  - 2.2 Introduction to SCRUM
  - 2.3 Introduction to Kanban

3. Testing
  - 3.1 Why testing?
  - 3.2 Unit tests
  - 3.3 Integration tests
  - 3.4 Performance monitoring
4. Software Development Paradigms
  - 4.1 Test-driven development (TDD)
  - 4.2 Pair programming
  - 4.3 Mob programming
  - 4.4 Extreme programming
5. From Model to Production
  - 5.1 Continuous delivery
  - 5.2 Continuous integration
  - 5.3 Building a scalable environment

## Literature

### Compulsory Reading

### Further Reading

- Farcic, V. (2016): The DevOps 2.0 toolkit: Automating the continuous deployment pipeline with containerized microservices. CreateSpace Independent Publishing Platform, Scotts Valley, CA.
- Humble, J./Farley, D. (2010): Continuous delivery: Reliable software releases through build, test, and deployment automation. Addison-Wesley Professional, Boston, MA.
- Humble, J./Molesky, J./O'Reilly, B. (2015): Lean enterprise. O'Reilly Publishing, Sebastopol, CA.
- Hunt, A./Thomas, D. (1999): The pragmatic programmer. From journeyman to master. Addison-Wesley, Reading, MA.
- Martin, R. C. (2008): Clean code. Prentice Hall, Boston, MA.
- Morris, K. (2016): Infrastructure as code. O'Reilly Publishing, Sebastopol, CA.
- Richardson, L./Ruby, S. (2007): RESTful web services. O'Reilly Publishing, Sebastopol, CA.
- Senge, P. (1990): The fifth discipline: The art and practice of the learning organization. Broadway Business, New York, NY.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSSE01

## Project: From Model to Production

Module Code: DLBDSMTP

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> DLBDSDSSE01, DLBDSIPWP01, DLBDSOOFPP01	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

Prof. Dr. Christian Müller-Kett (Project: From Model to Production)

### Contributing Courses to Module

- Project: From Model to Production (DLBDSMTP01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Oral Project Report

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

This course focuses on creating a setup which allows the integration of a predictive model into an enterprise-grade application or service.

**Learning Outcomes****Project: From Model to Production**

On successful completion, students will be able to

- understand the challenges of integrating a predictive model into an application or service.
- evaluate the constraints a project imposes on the execution of a predictive model.
- analyze the requirements regarding data acquisition, storage, and processing.
- identify the necessary monitoring components required for reliable execution of the predictive model.
- create and design a production environment for storing, accessing, and serving the predictive model.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

## Project: From Model to Production

Course Code: DLBDSMTP01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSDSSE01, DLBDSIPWP01, DLBDSOOFPP01

### Course Description

This project course will give students hands-on experience in the challenging task of bringing a predictive model into a production environment. Students will need to consider practical aspects such as data storage and processing, as well as constraints such as service availability and the maximum amount of time a model is allowed to run due to external project requirements. Through this course, students will obtain holistic overview of the integration of predictive models into enterprise-grade applications or services.

### Course Outcomes

On successful completion, students will be able to

- understand the challenges of integrating a predictive model into an application or service.
- evaluate the constraints a project imposes on the execution of a predictive model.
- analyze the requirements regarding data acquisition, storage, and processing.
- identify the necessary monitoring components required for reliable execution of the predictive model.
- create and design a production environment for storing, accessing, and serving the predictive model.

### Contents

- This project course focuses on practical aspects of ensuring that a predictive model can run in a production environment. The students start with a chosen use case and model and then evaluate the requirements which need to be fulfilled so that the model can be used as part of an enterprise application or app. Students need to evaluate requirements in terms of data storage, processing and throughput, and availability of the service, as well as the persistency, serving, and versioning of the model itself. Monitoring the execution of model predictions and raising alerts in cases of operational issues is a core part of building a reliable model pipeline. All relevant artifacts and considerations are documented by the students in a project report.

**Literature****Compulsory Reading****Further Reading**

- Geron, A. (2017). Hands-on machine learning with Scikit-Learn and TensorFlow. Sebastopol, CA: O'Reilly Publishing.
- Karau, H., Konwinski, A., Wendell, A., & Zaharia, M. (2015). Learning spark: Lightning-fast data analysis. Sebastopol, CA: O'Reilly Publishing.
- Kleppmann, M. (2017). Designing data-intensive Applications: The big ideas behind reliable, scalable, and maintainable systems. Sebastopol, CA: O'Reilly Publishing.
- Kuhn, M., & Johnson, K. (2013). Applied predictive modeling. New York, NY: Springer.
- Maydanchik, A. (2007). Data quality assessment. Denville, NJ: Technics Publications.
- Müller, A., & Guido, S. (2016). Introduction to machine learning with Python: A guide for data scientists. Boston, MA: O'Reilly.
- Narkhede, N., Shapira, G., & Palino, T. (2017). Kafka: The definitive guide: Real-time data and stream processing at scale. Sebastopol, CA: O'Reilly Publishing.
- Psaltis, A. (2017). Streaming data: Understanding the real-time pipeline. Shelter Island, NY: Manning Publications.
- White, T. (2015). Hadoop: The definitive guide: Storage and analysis at Internet scale. Sebastopol, CA: O'Reilly Publishing.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Oral Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSMTP01



## Seminar: Ethical Considerations in Data Science

Module Code: DLBDSSECDs

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

N.N. (Seminar: Ethical Considerations in Data Science)

### Contributing Courses to Module

- Seminar: Ethical Considerations in Data Science (DLBDSSECDs01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Research Essay

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

This course aims at creating an awareness of the ethical implications of data science techniques and methodologies. To this end, students will be given the opportunity to acquaint themselves with current literature on the topic and explore the pertinent lines of thinking.

**Learning Outcomes**

**Seminar: Ethical Considerations in Data Science**

On successful completion, students will be able to

- contemplate ethical considerations in the field of data science.
- describe how the application of data science methodology may have adverse ethical effects.
- reason about the ethical impacts of data science, both on a personal level and for society at large.
- explain how existing biases and inequalities could be amplified by technology.
- treat in a scientific manner a selected topic in the form of a written essay.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

## Seminar: Ethical Considerations in Data Science

Course Code: DLBDSSECD01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

Online trade, social media, media delivery, mass consumption, customer relationship management, hiring decisions, and more: There are hardly any aspects of contemporary life that are not affected by the application of data science methodologies and techniques. Thus, it is of central importance to gain an awareness of these implications and a thorough understanding of the ethical issues in question in order to be an informed practitioner in this field.

### Course Outcomes

On successful completion, students will be able to

- contemplate ethical considerations in the field of data science.
- describe how the application of data science methodology may have adverse ethical effects.
- reason about the ethical impacts of data science, both on a personal level and for society at large.
- explain how existing biases and inequalities could be amplified by technology.
- treat in a scientific manner a selected topic in the form of a written essay.

### Contents

- This seminar covers ethical implications of the use of data science methods and techniques. Each participant is expected to write a paper on an assigned topic.

**Literature****Compulsory Reading****Further Reading**

- Grus, J. (2019).  
Data science from scratch  
(2  
nd  
ed.). Sebastopol, CA: O'Reilly Media.
- Muller, J. Z. (2019).  
Tyranny of metrics  
. Princeton, NJ: Princeton University Press. (Original work published 2018).
- O'Neil, C. (2017).  
Weapons of math destruction: How big data increases inequality and threatens democracy  
(.). Portland, OR: Broadway Books. (Original work published 2016).
- Patil, D. J., Mason, H., & Loukides, M. (2018).  
Ethics and data science  
. Sebastopol, CA: O'Reilly Media.
- Wachter-Boettcher, S. (2018).  
Technically wrong: Sexist apps, biased algorithms, and other threats of toxic tech  
. New York, NY: W. W. Norton & Co.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Seminar
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Research Essay

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDSSECDS01







# 5. Semester

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## User Experience

Module Code: DLBMIUEX1\_E

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

N.N. (User Experience)

### Contributing Courses to Module

- User Experience (DLBMIUEX01\_E)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 90 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Basics of User Experience
- Customer Journey
- Selected UX Techniques
- UX Evaluation
- Information Design
- UX on a Large Scale

**Learning Outcomes****User Experience**

On successful completion, students will be able to

- describe, classify, and delimit the term user experience and its concepts.
- analyze touchpoints, create customer journey maps and describe personas.
- describe suitable techniques for user experience design and select them for a specific task.
- describe techniques for evaluating UX and identify appropriate ones for specific tasks.
- describe and delimit selected techniques for information design.
- describe and delimit concepts and approaches for designing user experience at the process, service and enterprise levels.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Design

**Links to other Study Programs of IUBH**

All Bachelor Programs in the Design, Architecture & Construction fields

# User Experience

Course Code: DLBMIUEX01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The term user experience (UX) generally refers to the experience that users and customers have in relationship to the products and services that a company offers. It is not only about improving the usability of IT systems, but also about analyzing, designing and evaluating the experience of users and customers. After an introduction to the topic of user experience, some methods for analyzing the user experience will be explained and their application will be discussed. Then, selected techniques for designing user experience and suitable approaches to information design are introduced. After that specific techniques for evaluating UX are discussed. Finally, it will be explained how UX can be designed specifically at the level of services and companies.

## Course Outcomes

On successful completion, students will be able to

- describe, classify, and delimit the term user experience and its concepts.
- analyze touchpoints, create customer journey maps and describe personas.
- describe suitable techniques for user experience design and select them for a specific task.
- describe techniques for evaluating UX and identify appropriate ones for specific tasks.
- describe and delimit selected techniques for information design.
- describe and delimit concepts and approaches for designing user experience at the process, service and enterprise levels.

## Contents

1. UX Basics
  - 1.1 Terms, Concepts, History
  - 1.2 User Experience Design and Management
  - 1.3 Selected Scenarios from Practice
2. Analysis
  - 2.1 Contextual Inquiry
  - 2.2 Touchpoint Analysis
  - 2.3 Customer Journey Map
  - 2.4 Persona

3. Finding Ideas
  - 3.1 Use Cases
  - 3.2 User Stories
  - 3.3 Storyboards
4. Design and Prototyping
  - 4.1 The Human Perception
  - 4.2 Card Sorting
  - 4.3 Sketches and Scribbles
  - 4.4 Wireframes
  - 4.5 Prototyping
  - 4.6 Guidelines and Style Guides
5. Evaluation
  - 5.1 Usability Testing
  - 5.2 Observation Techniques
  - 5.3 Interview Techniques and Questionnaires
6. "UX on a Large Scale"
  - 6.1 UX in Services and Business Processes
  - 6.2 Corporate UX

**Literature****Compulsory Reading****Further Reading**

- Buxton, William. Sketching User Experience: Getting the Design Right and the Right Design. San Francisco, Calif.: Morgan Kaufmann, 2007. Book.
- Garrett, Jesse James. The Elements of User Experience : User-Centered Design for the Web and Beyond. Voices That Matter Ser. Vol. 2nd ed., New edition, revised, Berkeley: New Riders, 2010. Book.
- Kuniavsky, Mike, Andrea Moed, and Elizabeth Goodman. Observing the User Experience [Electronic Resource] : A Practitioner's Guide to User Research. Waltham, MA Morgan Kaufmann, 2nd ed, 2012.
- Norman, Don. The Design of Everyday Things : Revised and Expanded Edition. Vol. Revised and expanded edition, New York: Basic Books, 2013. Book.
- Saul, Greenberg, Carpendale Sheelagh, Marquardt Nicolai, and Buxton Bill. Sketching User Experiences: The Workbook. Waltham, Mass: Morgan Kaufmann, 2012. Book.
- Brown, Diana DeMarco. Agile User Experience Design a Practitioner's Guide to Making It Work. Amsterdam [u.a.]: Elsevier MK, 2013. Monograph.
- Robier, Johannes. "Ux Redefined. Winning and Keeping Customers with Enhanced Usability and User Experience." Belgium, Europe: Springer International Publishing, 2016.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed



## UX-Project

Module Code: DLBMIUEX2\_E

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (UX-Project)

### Contributing Courses to Module

- UX-Project (DLBMIUEX02\_E)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Project Report

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

Practical project with focus on UX.

<p><b>Learning Outcomes</b></p> <p><b>UX-Project</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ independently carry out small and medium-sized project tasks in the field of UX and produce an appropriate result.</li> <li>▪ define a suitable approach to UX projects and identify appropriate techniques and methods specifically.</li> <li>▪ critically reflect and document the work process and the achieved result regarding the target achievement.</li> </ul>	
<p><b>Links to other Modules within the Study Program</b></p> <p>This module is similar to other modules in the field of Design</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All Bachelor Programs in the Design, Architecture &amp; Construction fields</p>

# UX-Project

Course Code: DLBMIUEX02\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim of the module is to apply the already acquired knowledge and skills on the subject of User Experience in a practical project. The students work on a self-organized project with focus on User Experience.

## Course Outcomes

On successful completion, students will be able to

- independently carry out small and medium-sized project tasks in the field of UX and produce an appropriate result.
- define a suitable approach to UX projects and identify appropriate techniques and methods specifically.
- critically reflect and document the work process and the achieved result regarding the target achievement.

## Contents

- The knowledge acquired in the course User Experience is applied to projects. The approach, the results achieved and the critical reflection are documented in a written project report.

## Literature

### Compulsory Reading

### Further Reading

- Barnum, Carol M. . Usability Testing Essentials : Ready, Set...Test! Amsterdam: Morgan Kaufmann, 2011. eBook.
- Cooper, Alan, Robert Reimann, David Cronin, and Christopher Noessel. About Face: The Essentials of Interaction Design. 4th ed. Hoboken: Wiley, 2014. eBook.
- Hartson, Rex, and Pardha S. Pyla. the Ux Book: Agile Ux Design for a Quality User Experience. 2nd ed. Cambridge: Morgan Kaufman, 2019. eBook.
- Robier, Johannes. "Ux Redefined. Winning and Keeping Customers with Enhanced Usability and User Experience." Belgium, Europe: Springer International Publishing, 2016. eBook.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Edge AI

Module Code: DLBAIPEAI

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 5	<b>Student Workload</b> 150 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Project: Edge AI)

### Contributing Courses to Module

- Project: Edge AI (DLBAIPEAI01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Written Assessment: Project Report

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

This project focuses on designing and prototyping an Edge AI system.

**Learning Outcomes****Project: Edge AI**

On successful completion, students will be able to

- combine a range of AI techniques in a technical implementation.
- explain the design choices and its implementation.
- transfer acquired theoretical knowledge to a real-world project.
- translate the learned theories into the practice of AI system building.
- critically evaluate the resulting model or system's performance.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

## Project: Edge AI

Course Code: DLBAIPEAI01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

Edge AI is an important part of artificial intelligence and becomes more and more important in modern system implementations. Instead of large computers or server farms, AI inferences are calculated in the physical system where they are needed. Examples for such a setup are autonomous vehicles interpreting sensor data and images, mobile systems, but also cyber-physical systems where “intelligence” needs to be close to the physical production system. Students learn how to evaluate the requirements of a complete Edge AI system, determine its requirements, and evaluate the constraints of the intended use and available edge computing resources. In the course “Project: Edge AI”, students choose a project task in accord with their tutor from a variety of options. The goal is to prototypically implement an Edge AI solution. The design and implementation choices, requirement and constraints are to be reasoned about, explained, and documented in a project report. To this end, students make practical use of the methodological knowledge acquired in the previous courses by applying them to relevant real-world problems.

### Course Outcomes

On successful completion, students will be able to

- combine a range of AI techniques in a technical implementation.
- explain the design choices and its implementation.
- transfer acquired theoretical knowledge to a real-world project.
- translate the learned theories into the practice of AI system building.
- critically evaluate the resulting model or system’s performance.

### Contents

- In this course the students work on a practical prototype implementation of an edge AI system. All relevant artifacts such as the design documentation, chosen implementation, code and the complete system, as well as outcomes are to be documented. Depending on the exact system that is to be designed and implemented as a prototype, students will draw on the theoretical knowledge gained from some or all of the previous courses and combine them in a new way to design an edge AI system.

**Literature****Compulsory Reading****Further Reading**

- Geron, A. (2019). Hands-on machine learning with Scikit-Learn and TensorFlow. 2nd Edition. Boston, MA: O'Reilly Publishing.
- Koul, A, Ganju, S & Kasam, M (2019). Practical Deep Learning for Cloud, Mobile& Edge: Computer Vision Projects Using Python, Keras & TensorFlow. Boston, MA: O'Reilly Publishing.
- Russel, S., & Norvig, P. (2009). Artificial intelligence: A modern approach (3rd ed.). Malaysia: Pearson.
- Wang, X., Han, Y., Leung, V. C., Niyato, D., Yan, X., & Chen, X. (2020). Edge AI: Convergence of Edge Computing and Artificial Intelligence. Springer Nature.
- Warden, P. & Situnayake, D. (2020). TinyML . Boston, MA: O'Reilly Publishing.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBAIPEAI01

# Introduction to Robotics

Module Code: DLBROIR\_E

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

Prof. Dr. Matthias Eifler (Introduction to Robotics)

## Contributing Courses to Module

- Introduction to Robotics (DLBROIR01\_E)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Exam or Written Assessment: Written  
Assignment, 90 Minutes

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- Introduction to Robotics
- Trends
- Industrial Robots
- Mobile Robots
- Applications

**Learning Outcomes****Introduction to Robotics**

On successful completion, students will be able to

- name important developments in the field of robotics.
- understand the mechanical structure and characteristics of robots.
- name characteristics and challenges of industrial robots.
- name characteristics and challenges of mobile robots.
- understand the role of robots in applications.
- name and understand current trends in the field of robotics.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Engineering

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Introduction to Robotics

Course Code: DLBROIR01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Robotics is experiencing very interesting developments, which experts describe as being a transition to a new generation of robots. We have moved from the “4Ds” of Robotics 1.0 (dull, dirty, dumb, dangerous) to the “4Ss” of Robotics 2.0 (smarter, safer, sensors, simple), but we still need to proceed further to the “4Ms” of Robotics 3.0 (multitasking, emotive, morphing, multiagent). This course, thus, provides the required background to understand the main development of robotics looking at industrial as well as at mobile robots, their main characteristics, issues, challenges, applications, and development trends.

## Course Outcomes

On successful completion, students will be able to

- name important developments in the field of robotics.
- understand the mechanical structure and characteristics of robots.
- name characteristics and challenges of industrial robots.
- name characteristics and challenges of mobile robots.
- understand the role of robots in applications.
- name and understand current trends in the field of robotics.

## Contents

1. What is Robotics?
  - 1.1 Basics and Definitions
  - 1.2 History and Cultural Influence
  - 1.3 Challenges and Trends (from Robotics 1.0 to Robotics 3.0)
2. Robots
  - 2.1 Mechanical Structure
  - 2.2 Kinematic Chains
  - 2.3 Market Overview

3. Industrial Robots
  - 3.1 Components of Industrial Robot Systems
  - 3.2 Characteristics
  - 3.3 Common Industrial Robots
  - 3.4 Applications
  - 3.5 Trends
  
4. Mobile Robots
  - 4.1 Components of Mobile Robot Systems
  - 4.2 Characteristics
  - 4.3 Common Mobile Robots
  - 4.4 Applications
  - 4.5 Trends
  
5. Applications
  - 5.1 Industrial Robots
  - 5.2 Healthcare
  - 5.3 Agriculture or Field Robotics
  - 5.4 Space and Defense
  - 5.5 Warehouse and Logistics
  - 5.6 Construction
  - 5.7 Wearables
  - 5.8 Social Robots

**Literature****Compulsory Reading****Further Reading**

- Ben-Ari, M./Mondada, F. (2017): Elements of Robotics. Springer International Publishing, Basel.
- Brooks, R. A. (2003): Flesh and machines: how robots will change us. Vintage Books, New York, NY.
- Gupta, A. K./Arora, S. K./Westcott, J. R. (2016): Industrial automation and robotics. Mercury Learning & Information.
- Lynch, K. M./Park, F. C. (2017): Modern robotics: mechanics, planning, and control. Cambridge University Press, Cambridge.
- Mihelj, M. et al (2018): Robotics. 2nd edition, Springer International Publishing, Basel.
- Siciliano, B./Khatib, O. (Eds.). (2016): Springer Handbook of Robotics. Springer International Publishing, Basel.
- Siegwart, R./Nourbakhsh, I. R./Scaramuzza, D. (2011): Introduction to Autonomous Mobile Robots. The MIT Press, Cambridge, MA.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam or Written Assessment: Written Assignment, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 100 h	<b>Presence</b> 0 h	<b>Tutorial</b> 25 h	<b>Self Test</b> 25 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed



# Agile Project Management

Module Code: DLBCSAPM

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	5	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

Dr. Mark Menzel (Agile Project Management)

## Contributing Courses to Module

- Agile Project Management (DLBCSAPM01)

## Module Exam Type

### Module Exam

Study Format: Distance Learning  
Written Assessment: Project Report

### Split Exam

## Weight of Module

see curriculum

## Module Contents

- In this course, students are taught action competences in the field of agile project management. They will be familiarized with the values, activities, roles, and artifacts of agile procedures using Scrum as an example.

**Learning Outcomes**

**Agile Project Management**

On successful completion, students will be able to

- explain the differences between agile and plan-driven project management.
- explain agile principles.
- work together in an agile manner according to the values defined in Scrum.
- apply the activities defined in Scrum.
- take responsibility for the roles defined in Scrum.
- create and maintain the artefacts defined in Scrum.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Computer Science & Software Development

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Agile Project Management

Course Code: DLBCSAPM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Students will receive a practical introduction to agile project management in this course. In addition to teaching its individual basic principles, the differences between agile project management and plan-driven project management will be examined in detail. In order to understand and experience agile project management, the values, activities, roles, and artefacts of typical agile procedures are presented using Scrum and then practiced on an example project.

## Course Outcomes

On successful completion, students will be able to

- explain the differences between agile and plan-driven project management.
- explain agile principles.
- work together in an agile manner according to the values defined in Scrum.
- apply the activities defined in Scrum.
- take responsibility for the roles defined in Scrum.
- create and maintain the artefacts defined in Scrum.

## Contents

- This course teaches students various skills in the field of agile project management. In contrast to plan-driven project management, the principles of agility used in modern software development are taught. Using the example of Scrum, students will acquire skills in applying an agile approach, and then apply their knowledge of respective roles and activities in a simple project to gain initial practical experience, documenting it in a project report. The content of the projects results from the individual abilities and requirements of the students.

**Literature****Compulsory Reading****Further Reading**

- Röpstorff, S./Wiechmann, R. (2012): Scrum in der Praxis. Erfahrungen, Problemfelder und Erfolgsfaktoren. dpunkt.verlag, Heidelberg.
- Rubin, K. S. (2014): Essential Scrum. Umfassendes Scrum-Wissen aus der Praxis. Mitp Verlag, Frechen.
- Roock, A. (2011): Software-Kanban. Eine Einführung. In: Projektmagazin, Heft 4,
- Leffingwell, D. et al. (o. J.): Scaled Agile Framework. (URL: <http://scaledagileframework.com/> [letzter Zugriff: 17.07.2015]).
- Schwaber, K./Sutherland, J. (o. J.): The Scrum Guide - The definitive Guide to Scrum: The Rules of the Game. [www.scrumguides.org](http://www.scrumguides.org)

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBCSAPM01

## Autonomous Driving

Module Code: DLBDSEAD

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

N.N. (Self-Driving Vehicles) / N.N. (Seminar: Current Topics and Trends in Self-Driving Technology)

### Contributing Courses to Module

- Self-Driving Vehicles (DLBDSEAD01)
- Seminar: Current Topics and Trends in Self-Driving Technology (DLBDSEAD02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Self-Driving Vehicles

- Study Format "Distance Learning": Exam, 90 Minutes (50)

##### Seminar: Current Topics and Trends in Self-Driving Technology

- Study Format "Distance Learning": Written Assessment: Research Essay (50)

### Weight of Module

see curriculum

<p><b>Module Contents</b></p> <p><b>Self-Driving Vehicles</b></p> <ul style="list-style-type: none"> <li>▪ Safety standards</li> <li>▪ Sensor fusion</li> <li>▪ Computer vision</li> <li>▪ Localization &amp; motion</li> <li>▪ Motion planning</li> </ul> <p><b>Seminar: Current Topics and Trends in Self-Driving Technology</b></p> <p>The seminar covers current topics of autonomous vehicles. The choice of topics can include (but are not limited to) recent technical advances as well as philosophical issues or implications for society, law, or relevant industries.</p>	
<p><b>Learning Outcomes</b></p> <p><b>Self-Driving Vehicles</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ cite relevant safety standards.</li> <li>▪ grasp the concepts of sensors and sensor fusion.</li> <li>▪ apply computer vision techniques to detect features.</li> <li>▪ evaluate images in terms of semantic segmentation.</li> <li>▪ understand motion models and localization approaches.</li> <li>▪ utilize motion planning techniques.</li> </ul> <p><b>Seminar: Current Topics and Trends in Self-Driving Technology</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ transfer theoretical knowledge and methods to new domains.</li> <li>▪ understand recent developments in self-driving vehicles.</li> <li>▪ create new insights based on detailed studies of current research and technology.</li> </ul>	
<p><b>Links to other Modules within the Study Program</b></p> <p>This module is similar to other modules in the field of Engineering</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All Bachelor Programmes in the IT &amp; Technology fields</p>



# Self-Driving Vehicles

Course Code: DLBDSEAD01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course focuses on the foundations of autonomous vehicles and starts with a detailed introduction to relevant safety standards in terms of functional and IT security. This course continues with a presentation of the concept of sensor fusion and discusses relevant aspects of computer vision techniques such as feature detection, calibration, and semantic segmentation. A large part of the course concerns localization and motion planning. Relevant motion models are introduced and localization techniques such as odometry, triangulation, and satellite-based systems are discussed in detail, along with path planning, motion prediction, and trajectory generation.

## Course Outcomes

On successful completion, students will be able to

- cite relevant safety standards.
- grasp the concepts of sensors and sensor fusion.
- apply computer vision techniques to detect features.
- evaluate images in terms of semantic segmentation.
- understand motion models and localization approaches.
- utilize motion planning techniques.

## Contents

1. Sensors
  - 1.1 Physical principles of sensors
  - 1.2 Types of sensors
  - 1.3 Sensor calibration
  - 1.4 Application scenarios
2. Sensor Fusion
  - 2.1 Elaborating data from sensors
  - 2.2 Kalman filter
  - 2.3 Object tracking

3. Computer Vision
  - 3.1 Pixels and filters
  - 3.2 Feature detection
  - 3.3 Distortions and calibration
  - 3.4 Semantic segmentation
4. Localization & Motion
  - 4.1 Motion models
  - 4.2 Odometry
  - 4.3 Triangulation
  - 4.4 Satellite-based localization
5. Motion planning
  - 5.1 Path planning
  - 5.2 Motion prediction
  - 5.3 Trajectory generation
6. Safety Standards
  - 6.1 Functional Safety
  - 6.2 IT Security Standards
  - 6.3 Safety development approaches

**Literature****Compulsory Reading****Further Reading**

- Ben-Ari, M./Mondada, F. (2018): Elements of robotics. Springer, Cham.
- European Union. (2001): Directive 2001/95/EG. (URL: <https://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX%3A32001L0095> [Retrieved: 28.02.2020])
- Fisher, R. B., et al. (2016): Dictionary of computer vision and image processing. John Wiley & Sons, Chichester.
- International Electrotechnical Commission. (2015): IEC 61508. (URL: <https://www.iec.ch/functionalsafety/> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2009): ISO 15408. (URL: <https://www.iso.org/standard/50341.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 25119. (URL: <https://www.iso.org/standard/69026.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 26262. (URL: <https://www.iso.org/standard/68383.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (n.d.): ISO 21434. (URL: <https://www.iso.org/standard/70918.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO/IEC 27001. (URL: <https://www.iso.org/isoiec-27001-information-security.html> [Retrieved: 28.02.2020])
- Rausand, M. (2014): Reliability of safety-critical systems: Theory and applications. Wiley, Hoboken, NJ.
- Smith, D. J./Simpson, K. (2016): The safety critical systems handbook. 4th ed., Elsevier, Oxford.
- Smith, D. J. (2017): Reliability, maintainability and risk. 9th ed., Elsevier, Oxford.
- Society of Automobile Engineers International. (2012): SAE J3061. (URL: <https://www.sae.org/standards/content/j3061/> [Retrieved: 28.02.2020])
- Szelski, R. (2011): Computer vision: Algorithms and applications. 2nd ed., Springer VS, Wiesbaden.
- Wang, P. K.-C. (2015): Visibility-based optimal path and motion planning (vol. 568). Springer, Cham.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Seminar: Current Topics and Trends in Self-Driving Technology

Course Code: DLBDSEAD02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course focuses on recent developments in the field of self-driving vehicles. Following the course Self-Driving Vehicles (DLBDSEAD01), in this course students will focus on a particular topic in the context of autonomous driving, applying the knowledge they have obtained in the first course. Finally, a research essay will be written.

## Course Outcomes

On successful completion, students will be able to

- transfer theoretical knowledge and methods to new domains.
- understand recent developments in self-driving vehicles.
- create new insights based on detailed studies of current research and technology.

## Contents

- The seminar covers current topics of autonomous vehicles. The choice of topics can include (but are not limited to) recent technical advances as well as philosophical issues or implications for society, law, or relevant industries.

**Literature****Compulsory Reading****Further Reading**

- Ben-Ari, M./Mondada, F. (2018): Elements of robotics. Springer, Cham.
- European Union. (2001): Directive 2001/95/EG. (URL: <https://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX%3A32001L0095> [Retrieved: 28.02.2020])
- Fisher, R. B., et al. (2016): Dictionary of computer vision and image processing. John Wiley & Sons, Chichester.
- International Electrotechnical Commission. (2015): IEC 61508. (URL: <https://www.iec.ch/functionalsafety/> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2009): ISO 15408. (URL: <https://www.iso.org/standard/50341.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 25119. (URL: <https://www.iso.org/standard/69026.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 26262. (URL: <https://www.iso.org/standard/68383.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (n.d.): ISO 21434. (URL: <https://www.iso.org/standard/70918.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO/IEC 27001. (URL: <https://www.iso.org/isoiec-27001-information-security.html> [Retrieved: 28.02.2020])
- Marchthaler, R./Dingler, S. (2017): Kalman-Filter. Springer, Wiesbaden.
- Rausand, M. (2014): Reliability of safety-critical systems: Theory and applications. Wiley, Hoboken, NJ.
- Smith, D. J./Simpson, K. (2016): The safety critical systems handbook. 4th ed., Elsevier, Oxford.
- Smith, D. J. (2017): Reliability, maintainability and risk. 9th ed., Elsevier, Oxford.
- Society of Automobile Engineers International. (2012): SAE J3061. (URL: <https://www.sae.org/standards/content/j3061/> [Retrieved: 28.02.2020])
- Szelski, R. (2011): Computer vision: Algorithms and applications. 2nd ed., Springer VS, Wiesbaden.
- Wang, P. K.-C. (2015): Visibility-based optimal path and motion planning (vol. 568). Springer, Cham.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Seminar
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Research Essay

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAD02



# Automation and Robotics

Module Code: DLBDSEAR

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> <ul style="list-style-type: none"> <li>▪ none</li> <li>▪ DLBDSEAR01</li> </ul>	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

Prof. Dr. Mario Boßlau (Production Engineering) / N.N. (Automation and Robotics)

## Contributing Courses to Module

- Production Engineering (DLBDSEAR01)
- Automation and Robotics (DLBDSEAR02)

## Module Exam Type

<b>Module Exam</b>	<b>Split Exam</b> <u>Production Engineering</u> <ul style="list-style-type: none"> <li>• Study Format "Distance Learning": Exam, 90 Minutes (50)</li> </ul> <u>Automation and Robotics</u> <ul style="list-style-type: none"> <li>• Study Format "Distance Learning": Module Exam (50)</li> </ul>
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## Weight of Module

see curriculum

### **Module Contents**

#### **Production Engineering**

- Introduction to Manufacturing Technology
- Main Production Groups According to DIN 8580
- Additive Manufacturing Processes
- Rapid Prototyping
- Rapid Tooling
- Direct/Rapid Manufacturing
- Cyber-Physical Production Plants

#### **Automation and Robotics**

- Basics of Automation
- Fundamentals of Measurement Technology
- Sensors
- Basics of Control Engineering
- Basics of Control Technology
- Introduction to Robotics
- Kinematics of a Robot

### Learning Outcomes

#### Production Engineering

On successful completion, students will be able to

- understand the basic concepts and interrelationships of production engineering.
- understand current changes in manufacturing technology due to technologies such as additive manufacturing and megatrends such as cyber physical systems.
- assign different manufacturing processes to the main manufacturing groups according to DIN 8580.
- understand the basic principle of additive manufacturing processes.
- distinguish between different additive manufacturing processes.
- understand the terms Rapid Prototyping, Rapid Tooling, and Direct Manufacturing and name individual processes and application examples.
- understand the elements and properties of cyber-physical production plants.

#### Automation and Robotics

On successful completion, students will be able to

- understand the basic aspects of automation.
- understand the different sizes and units in measurement technology.
- differentiate between different measurement methods.
- understand the basic structure of measuring equipment.
- select a suitable sensor based on various criteria.
- understand the elements of control systems.
- describe the behavior of control systems in the time and frequency domain.
- understand the basic principles of control technology.
- convert between different number systems and apply Boolean algebra.
- understand the structure of switching networks, plants, and storages.
- understand important elements of control systems such as signal generators and power amplifiers.
- design simple programmable logic controllers.
- understand the basic structure of industrial robots.
- calculate different movements and positions of jointed-arm robots.

#### Links to other Modules within the Study Program

This module is similar to other modules in the field of Engineering

#### Links to other Study Programs of IUBH

All Bachelor Programmes in the IT & Technology fields

# Production Engineering

Course Code: DLBDSEAR01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim of the course is to provide students with an overview of the processes that have influenced and still influence production processes through technological developments under the generic term Industry 4.0, based on traditional, standardized manufacturing techniques. These include, in particular, technological advances in additive manufacturing processes that enable applications such as rapid prototyping, rapid tooling, and direct manufacturing. Finally, the course deals with the consequences of the digitalization and networking of production facilities and their elements in the sense of a cyber-physical system.

## Course Outcomes

On successful completion, students will be able to

- understand the basic concepts and interrelationships of production engineering.
- understand current changes in manufacturing technology due to technologies such as additive manufacturing and megatrends such as cyber physical systems.
- assign different manufacturing processes to the main manufacturing groups according to DIN 8580.
- understand the basic principle of additive manufacturing processes.
- distinguish between different additive manufacturing processes.
- understand the terms Rapid Prototyping, Rapid Tooling, and Direct Manufacturing and name individual processes and application examples.
- understand the elements and properties of cyber-physical production plants.

## Contents

1. Introduction to Manufacturing Technology
  - 1.1 Basic Terms and Contexts in Manufacturing Theory
  - 1.2 Historical Development of Production
  - 1.3 The Discussion About the Long Tail

2. Main Production Groups According to DIN 8580
  - 2.1 Archetypes
  - 2.2 Reshaping
  - 2.3 Cutting (Cutting, Machining, Ablation)
  - 2.4 Joining
  - 2.5 Coating
  - 2.6 Substance Property Changes
3. Additive Manufacturing Processes
  - 3.1 Basic Principles and Legal Aspects
  - 3.2 Stereolithography (STL)
  - 3.3 Selective Laser Sintering and Selective Beam Melting With Laser or Electron Beam
  - 3.4 Fused Deposition Modeling (FDM)
  - 3.5 Multi-Jet Modeling (MJM) and Poly-Jet Process (PJM)
  - 3.6 3D Printing Process (3DP)
  - 3.7 Laminating Processes
  - 3.8 Mask Sintering
4. Rapid Prototyping
  - 4.1 Definition
  - 4.2 Strategic and Operational Aspects
  - 4.3 Application Areas and Examples
5. Rapid Tooling
  - 5.1 Definition, Strategic, and Operational Aspects
  - 5.2 Indirect and Direct Procedures
6. Direct/Rapid Manufacturing
  - 6.1 Potentials and Requirements for Procedures
  - 6.2 Implementation, Application Areas, and Examples
7. Cyber-Physical Production Plants
  - 7.1 Derivation of the Terms Industry 4.0 and Cyber-Physical Systems
  - 7.2 Megatrend Cyber Physical Systems (CPS)
  - 7.3 Definition Cyber-Physical Production Plant
  - 7.4 Effects on Planning and Operation of Production Facilities
  - 7.5 Dynamic Reconfiguration and Migration of Production Facilities

**Literature****Compulsory Reading****Further Reading**

- Anderson, C. (2012): Makers. The new industrial revolution. Crown Business, New York.
- Bauernhansl, Thomas/Hompel, M. ten/Vogel-Heuser, B. (Hrsg.) (2014): Industrie 4.0 in Produktion, Automatisierung und Logistik. Anwendung – Technologien – Migration. Springer, Wiesbaden.
- Gebhardt, A. (2012): Understanding Additive Manufacturing. Rapid Prototyping – Rapid Tooling – Rapid Manufacturing. Hanser, München/Cincinnati.
- Lachmayer, R./Lippert, R. B./Fahlbusch, T. (Hrsg.) (2016): 3D-Druck beleuchtet. Additive Manufacturing auf dem Weg in die Anwendung. Springer, Berlin/Heidelberg.
- Wittenstein, M. et al. (Hrsg.) (2015): Intelligente Vernetzung in der Fabrik. Industrie 4.0. Umsetzungsbeispiele für die Praxis. Fraunhofer Verlag, Stuttgart.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Automation and Robotics

Course Code: DLBDSEAR02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSEAR01

### Course Description

The aim of the course is to provide students with an insight into measurement, control, and regulation technology and convey the basics of robotics. Students will be taught which methods can be used to determine certain measured variables and how measurement errors are dealt with. Based on these fundamentals, various sensors will be presented and students will be able to select suitable sensors based on predefined criteria. The course also introduces students to the basics of control engineering. The different ways of describing the structure and behaviour of control systems are illustrated to the students. The basics of control engineering are also taught. The students receive a short introduction to binary number systems and Boolean algebra, and deal with various basal circuit and control elements. Finally, students will gain an insight into robotics with a focus on industrial robots. In this context, the students learn the description and calculation of positions and movements of individual limbs of a robot arm.

### Course Outcomes

On successful completion, students will be able to

- understand the basic aspects of automation.
- understand the different sizes and units in measurement technology.
- differentiate between different measurement methods.
- understand the basic structure of measuring equipment.
- select a suitable sensor based on various criteria.
- understand the elements of control systems.
- describe the behavior of control systems in the time and frequency domain.
- understand the basic principles of control technology.
- convert between different number systems and apply Boolean algebra.
- understand the structure of switching networks, plants, and storages.
- understand important elements of control systems such as signal generators and power amplifiers.
- design simple programmable logic controllers.
- understand the basic structure of industrial robots.
- calculate different movements and positions of jointed-arm robots.



**Contents**

1. Basics of Automation
  - 1.1 Basic Terms
  - 1.2 Economic Aspects
  - 1.3 Automation Pyramid
  - 1.4 Measuring, Control, and Regulation Systems
2. Fundamentals of Measurement Technology
  - 2.1 Measurands and Units
  - 2.2 Forms of Measurement Signals
  - 2.3 Measurement Techniques
  - 2.4 Measuring Equipment
  - 2.5 Evaluation of Measurements and Measurement Errors
3. Sensors
  - 3.1 Function and Elements of Sensors
  - 3.2 Criteria for the Selection of Sensors
  - 3.3 Proximity Switches
  - 3.4 Photoelectric Sensors
  - 3.5 Ultrasonic Sensors
  - 3.6 Rotary Encoder
  - 3.7 Force, Torque, and Pressure Gauges
  - 3.8 Temperature Sensors
  - 3.9 Image Processing Sensors
4. Basics of Control Engineering
  - 4.1 Elements of Control Systems
  - 4.2 Structure Description
  - 4.3 Static Behavioral Description
  - 4.4 Behavioral Description in the Time Domain
  - 4.5 Behavioral Description in the Frequency Domain
  - 4.6 Practical examples

5. Basics of Control Technology
  - 5.1 Basic Principle and Elements of Control Systems
  - 5.2 Numerical Representations
  - 5.3 Boolean Algebra
  - 5.4 Switching Networks, Plants, and Storage Facilities
  - 5.5 Signal Generators and Power Amplifiers
  - 5.6 Programmable Logic Controllers
  - 5.7 Connection-Programmed Controls
  
6. Introduction to Robotics
  - 6.1 Terms and Classification
  - 6.2 Basic Elements
  - 6.3 Classification of Robots
  
7. Kinematics of a Robot
  - 7.1 Coordinate Systems and Reference Points
  - 7.2 Rotations
  - 7.3 Forward and Reverse Transformations
  - 7.4 Denavit-Hartenberg Transformation

### Literature

#### Compulsory Reading

#### Further Reading

- Heinrich, B./Linke, P./Glöckler, M. (2015): Grundlagen Automatisierung. Springer, Wiesbaden.
- Hesse, S./Malisa, V. (Hrsg.) (2016): Taschenbuch Robotik – Montage – Handhabung. 2. Auflage, Carl Hanser Verlag, München.
- Jazar, R. N. (2010): Theory of Applied Robotics. 2. Auflage, Springer US, Boston (MA).
- Karaali, C. (2013): Grundlagen der Steuerungstechnik. Springer, Wiesbaden.
- Parthier, R. (2011): Messtechnik. Grundlagen und Anwendungen der elektrischen Messtechnik für alle technischen Fachrichtungen und Wirtschaftsingenieure. 6. Auflage, Vieweg & Teubner, Wiesbaden.
- Tietze, U./Schenk, C./Gamm, E. (2016): Halbleiter-Schaltungstechnik. 15. Auflage, Springer, Berlin.
- Zacher, S./Reuter, M. (2014): Regelungstechnik für Ingenieure. Springer, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAR02

## Data Engineer

Module Code: DLBDSEDE

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

### Module Coordinator

N.N. (Data Engineering) / N.N. (Project: Data Engineering)

### Contributing Courses to Module

- Data Engineering (DLBDSEDE01)
- Project: Data Engineering (DLBDSEDE02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Data Engineering

- Study Format "Distance Learning": Exam, 90 Minutes

##### Project: Data Engineering

- Study Format "Distance Learning": Portfolio

### Weight of Module

see curriculum

**Module Contents****Data Engineering**

- understand important foundational concepts in data engineering.
- recognize established and commonly-employed NoSQL datastores and their salient characteristics.
- comprehend common architectural patterns for data processing at scale.
- explain the concept of containerization as a virtualization approach.
- analyze operational challenges in the set-up and maintenance of data pipelines.
- demonstrate familiarity with concepts relating to data security and protection.

**Project: Data Engineering**

- formulate and implement a real-world data engineering use case.
- select appropriate resources for the task at hand.
- transfer acquired specialized knowledge in data engineering to a real-world use case.
- derive relevant design choices from the given project setting.
- analyze the suitability of different solution options with respect to the project task.
- make apposite choices with respect to implementation alternatives.

**Learning Outcomes****Data Engineering**

On successful completion, students will be able to

- understand important foundational concepts in data engineering.
- recognize established and commonly-employed NoSQL datastores and their salient characteristics.
- comprehend common architectural patterns for data processing at scale.
- explain the concept of containerization as a virtualization approach.
- analyze operational challenges in the set-up and maintenance of data pipelines.
- demonstrate familiarity with concepts relating to data security and protection.

**Project: Data Engineering**

On successful completion, students will be able to

- formulate and implement a real-world data engineering use case.
- select appropriate resources for the task at hand.
- transfer acquired specialized knowledge in data engineering to a real-world use case.
- derive relevant design choices from the given project setting.
- analyze the suitability of different solution options with respect to the project task.
- make apposite choices with respect to implementation alternatives.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field(s) of Data Science & Artificial Intelligence.

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology field(s).

# Data Engineering

Course Code: DLBDESEDE01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course explores concepts of data engineering. Data engineering is concerned with the infrastructure aspects of data science such as data storage and provision, as well as the provisioning of suitable operational environments. After laying out foundational notions and concepts of the discipline, this course addresses important developments in storage technology; aspects of systems architecture for processing data at scale; containerization as a modern take on virtualization; and the logic of data pipelines and associated operational aspects. Important issues pertaining to data security and protection are also given appropriate attention.

## Course Outcomes

On successful completion, students will be able to

- understand important foundational concepts in data engineering.
- recognize established and commonly-employed NoSQL datastores and their salient characteristics.
- comprehend common architectural patterns for data processing at scale.
- explain the concept of containerization as a virtualization approach.
- analyze operational challenges in the set-up and maintenance of data pipelines.
- demonstrate familiarity with concepts relating to data security and protection.

## Contents

1. Foundations of Data Engineering
  - 1.1 Reliability
  - 1.2 Scalability
  - 1.3 Maintainability
2. NoSQL In Depth
  - 2.1 Fundamentals of NoSQL
  - 2.2 Established NoSQL solutions
3. Architectures for Data Processing at Scale
  - 3.1 Batch processing architectures
  - 3.2 Architectures for stream and complex event processing
  - 3.3 Lambda architecture

4. Containerization In Depth
  - 4.1 Docker containers
  - 4.2 Container management
5. Governance & Security
  - 5.1 Data protection
  - 5.2 Data security
  - 5.3 Data governance
6. Operational Aspects
  - 6.1 Defining principles of DataOps
  - 6.2 Building and maintaining data pipelines
  - 6.3 Metrics and monitoring

## Literature

### Compulsory Reading

### Further Reading

- Kleppmann, M. (2017). *Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems*. Sebastopol, CA: O'Reilly.
- Marz, N., & Warren, J. (2015). *Big data: Principles and best practices of scalable realtime data systems*. Shelter Island, NY: Manning Publications.
- Matthias, K., & Kane, S. P. (2018). *Docker: Up & running (2nd ed.)*. Sebastopol, CA: O'Reilly.
- Miell, I., & Sayers, A. (2019). *Docker in practice (2nd ed.)*. Shelter Island, NY: Manning Publications.
- Muhammad, S., & Akhtar, F. (2018). *Big data architect's handbook*. Birmingham: Packt Publishing.
- Schenker, G. N. (2018). *Learn Docker - Fundamentals of Docker 18.x: Get up and running with the concepts of Docker*. Birmingham: Packt Publishing.
- Wilson, J., Redmond, E., & Perkins, L. (2018). *Seven databases in seven weeks (2nd ed.)*. Raleigh, NC: Pragmatic Bookshelf.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Data Engineering

Course Code: DLBDESEDE02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The focus of this course is the implementation of a real-world data engineering use case in the form of a student portfolio. To this end, students choose a project subject from the various sub-domains of data engineering. Examples include setting up a Docker container environment or dockerized service; implementing a data pipeline according to DataOps principles; and setting up an NoSQL data store. The goal is for students to demonstrate they can transfer theoretical knowledge to an implementation scenario that closely mimics practical work in a professional data engineering setting.

### Course Outcomes

On successful completion, students will be able to

- formulate and implement a real-world data engineering use case.
- select appropriate resources for the task at hand.
- transfer acquired specialized knowledge in data engineering to a real-world use case.
- derive relevant design choices from the given project setting.
- analyze the suitability of different solution options with respect to the project task.
- make apposite choices with respect to implementation alternatives.

### Contents

- This course covers the practical implementation of approaches and techniques covered in the preceding methodological course in a project-oriented setting. Each participant must produce a portfolio detailing and documenting the work. Portfolio themes are chosen from a list, or suggested by the students in accord with the tutor.

**Literature****Compulsory Reading****Further Reading**

- Kleppmann, M. (2017). *Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems*. Sebastopol, CA: O'Reilly.
- Marz, N., & Warren, J. (2015). *Big data: Principles and best practices of scalable realtime data systems*. Shelter Island, NY: Manning Publications.
- Matthias, K., & Kane, S. P. (2018). *Docker: Up & running (2nd ed.)*. Sebastopol, CA: O'Reilly.
- Miell, I., & Sayers, A. (2019). *Docker in practice (2nd ed.)*. Shelter Island, NY: Manning Publications.
- Muhammad, S., & Akhtar, F. (2018). *Big data architect's handbook*. Birmingham: Packt Publishing.
- Schenker, G. N. (2018). *Learn Docker - Fundamentals of Docker 18.x: Get up and running with the concepts of Docker*. Birmingham: Packt Publishing.
- Wilson, J., Redmond, E., & Perkins, L. (2018). *Seven databases in seven weeks (2nd ed.)*. Raleigh, NC: Pragmatic Bookshelf.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Digital Signal Processing and Sensor Technology

Module Code: DLBAIEDSPST

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Digital Signal Processing) / Prof. Dr. Leonardo Riccardi (Sensor Technology)

### Contributing Courses to Module

- Digital Signal Processing (DLBROEICR01\_E)
- Sensor Technology (DLBROST01\_E)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Digital Signal Processing

- Study Format "Distance Learning": Exam, 90 Minutes (50)

##### Sensor Technology

- Study Format "Distance Learning": Exam, 90 Minutes

### Weight of Module

see curriculum

**Module Contents****Digital Signal Processing**

- Signal sampling and quantization
- Digital signals and systems
- Discrete Fourier Transform
- z-Transform
- Digital signal processing and filters

**Sensor Technology**

- Sensors and transducers
- Resistive, capacitive, inductive, optical and acoustic sensor effects
- Transduction platforms and sensor systems
- Applications
- Advanced sensors

**Learning Outcomes****Digital Signal Processing**

On successful completion, students will be able to

- analyze discrete time systems.
- apply analysis tools such as the Discrete Fourier Transform.
- apply the z-Transform.
- analyze properties of discrete systems.
- design finite and infinite impulse response filters.
- implement filters in hardware and software.

**Sensor Technology**

On successful completion, students will be able to

- understand the main sensor characteristics.
- read and understand a typical sensor data sheet.
- understand sensor effects.
- understand and characterize sensor platforms.
- select the appropriate sensor technology for a given application.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Engineering

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Digital Signal Processing

Course Code: DLBROEICR01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Digital signal processing enables digital audio and video extraction, as well as extraction of important features from any other kind of signal, for instance medical imagery or diagnostic tools. This course provides the students with expertise on the theory and practice of digital signal processing. In the first part, theoretical concepts are introduced, presenting the main tools for analysis of digital, i.e., sampled or discrete-time systems. The core of digital signal processing resides in the design of a digital filter. The second part of the course focuses on different filter-design approaches, i.e. a discussion on finite impulse response and infinite impulse response filters. The last part gives important insights into the hardware and software implementation of digital signal processing, bridging theory with applied practice.

## Course Outcomes

On successful completion, students will be able to

- analyze discrete time systems.
- apply analysis tools such as the Discrete Fourier Transform.
- apply the z-Transform.
- analyze properties of discrete systems.
- design finite and infinite impulse response filters.
- implement filters in hardware and software.

## Contents

1. Introduction
  - 1.1 Basic Concepts
  - 1.2 Applications
2. Signal Sampling and Quantization
  - 2.1 Sampling
  - 2.2 Signal reconstruction
  - 2.3 Analog-to-digital Conversion
  - 2.4 Digital-to-Analog Conversion
  - 2.5 Quantization

3. Digital Signals and Systems
  - 3.1 Digital Signals
  - 3.2 Difference Equations and Impulse Responses
  - 3.3 BIBO-Stability
  - 3.4 Digital Convolution
4. Discrete Fourier Transform
  - 4.1 Discrete Fourier Transform
  - 4.2 Amplitude and Power Spectrum
  - 4.3 Spectral Estimation
5. The z-Transform
  - 5.1 Definition
  - 5.2 Properties
  - 5.3 Inverse z-Transform
  - 5.4 Solution of Difference Equations
6. Digital Signal Processing Systems and Filters
  - 6.1 Difference Equation and Transfer Function
  - 6.2 Poles, Zeros and Stability
  - 6.3 Digital Filter Frequency Response
  - 6.4 Basic Filtering
  - 6.5 Realization of Digital Filters
  - 6.6 Applications
7. Finite Impulse Response Filter Design
  - 7.1 Basics
  - 7.2 Fourier Transform Design
  - 7.3 Window Method
  - 7.4 Frequency Sampling Design Method
  - 7.5 Optimal Design Method
  - 7.6 Applications



8. Infinite Impulse Response Filter Design
  - 8.1 Basics
  - 8.2 Bilinear Transformation Design Method
  - 8.3 Butterworth and Chebyshev Filter Designs
  - 8.4 Higher-Order Infinite Impulse Response Filter Design
  - 8.5 Pole-Zero Placement for Simple Filters
  - 8.6 Applications
9. Hardware and Software for Digital Signal Processing
  - 9.1 Digital Signal Processor Architecture
  - 9.2 Digital Signal Processor Hardware Units
  - 9.3 Fixed-Point and Floating-Point Formats
  - 9.4 Implementation of FIR and IIR Filters in Fixed-Point
  - 9.5 DSP Programming Examples

**Literature****Compulsory Reading****Further Reading**

- Manolakis, D. G./Ingle, V. K. (2011): Applied digital signal processing: theory and practice. Cambridge University Press, Cambridge.
- Tan, L./Jiang, J. (2013): Digital signal processing: fundamentals and applications. 2nd ed., Academic Press, Cambridge, MS.
- Vetterli, M./Kovačević, J./Goyal, V. K. (2014): Foundations of signal processing. 2nd ed., Cambridge University Press, Cambridge.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

# Sensor Technology

Course Code: DLBROST01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Sensors are at the base of any modern engineering system, for example, control systems in robotics. This course provides the basic knowledge to understand sensors and their characteristics. A specific sensor is chosen for an application mainly based on its characteristics and on its physical effect. After an introduction on sensors and types of sensors, this course introduces the main characteristics such as accuracy, precision, resolution, sensitivity, linearity, static and dynamic properties. The second part of the course details the main sensor effects and shows how sensor systems can be built based on such effects and used in engineering applications. The last part of the course shows current trends and advanced applications of sensor technology.

## Course Outcomes

On successful completion, students will be able to

- understand the main sensor characteristics.
- read and understand a typical sensor data sheet.
- understand sensor effects.
- understand and characterize sensor platforms.
- select the appropriate sensor technology for a given application.

## Contents

1. Introduction to Measurement Uncertainty
  - 1.1 Measurement Uncertainty
  - 1.2 Confidence Intervals
  - 1.3 Expression of Uncertainty
2. Sensors
  - 2.1 Sensors and Transducers
  - 2.2 Selection of Sensors
  - 2.3 Sensor Characteristics
  - 2.4 Measurement Systems and Components

3. Resistive Sensors
  - 3.1 Resistivity and Resistance
  - 3.2 Potentiometric Sensors
  - 3.3 Strain Gauges
  - 3.4 Piezoresistive Sensors
  - 3.5 Magnetoresistive Sensors
  - 3.6 Thermoresistive Sensors
  - 3.7 Optoresistive Sensors
4. Capacitive Sensors
  - 4.1 Capacitance and Permittivity
  - 4.2 Configurations
  - 4.3 Applications
5. Inductive and Magnetic Sensors
  - 5.1 Magnetic and Electromagnetic Quantities
  - 5.2 Magnetic Field Sensors
  - 5.3 Magnetic Displacement and Force Sensors
  - 5.4 Applications
6. Optical Sensors
  - 6.1 Electro-Optical Components
  - 6.2 Optical Displacement Sensors
  - 6.3 Applications
7. Piezoelectric Sensors
  - 7.1 Piezoelectricity
  - 7.2 Force Pressure and Acceleration Sensors
  - 7.3 Applications
8. Acoustic Sensors
  - 8.1 Acoustic Medium
  - 8.2 Measurement Methods
  - 8.3 Applications

9. Advanced Sensor Technology
  - 9.1 Organic Sensors
  - 9.2 Sensors for Health and Environment
  - 9.3 Wearable Sensors
  - 9.4 Wireless Sensors in Industrial Environments

**Literature****Compulsory Reading****Further Reading**

- Kalantar-Zadeh, K. (2013): Sensors: An Introductory Course. Springer US, New York, NY.
- Lin, Y. L. et al (eds.) (2015): Smart Sensors and Systems. Springer International Publishing, Cham.
- Mukhopadhyay, S. C. (ed.) (2016): Next Generation Sensors and Systems. In: Smart Sensors, Measurement and Instrumentation, Vol. 16. Springer International Publishing, Cham.
- Regtien, P./Dertien, E. (2018): Sensors for Mechatronics. 2nd ed., Elsevier, Amsterdam.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Database Developer

Module Code: DLBAIEDD

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Ralf Kneuper (Database Modeling and Database Systems) / Sharam Dadashnia (Project: Build a Data Mart in SQL)

### Contributing Courses to Module

- Database Modeling and Database Systems (DLBCSDMDS01)
- Project: Build a Data Mart in SQL (DLBDSPBDM01)

### Module Exam Type

#### Module Exam

#### Split Exam

Database Modeling and Database Systems

- Study Format "Distance Learning": Exam, 90 Minutes

Project: Build a Data Mart in SQL

- Study Format "Distance Learning": Portfolio

### Weight of Module

see curriculum

**Module Contents****Database Modeling and Database Systems**

- Fundamentals of relational databases
- Simple database queries
- Entity/Relationship (E/R) Diagrams
- Database development
- Complex database queries across multiple tables
- Changing data in databases
- NoSQL database systems

**Project: Build a Data Mart in SQL**

This course is about the implementation of a practical database use case employing previously-acquired knowledge on pertaining approaches and methods.

**Learning Outcomes****Database Modeling and Database Systems**

On successful completion, students will be able to

- describe the basic concepts of the relational data model and distinguish them from each other.
- visually model data schemas.
- know SQL queries, read data from databases, change the data stock, and have experience in their use.
- design, create, and modify SQL queries and data schemas for SQL databases, and have experience using them.
- independently design database schemas and create database queries to solve concrete problems.
- know the most important NoSQL concepts and distinguish them from each other.

**Project: Build a Data Mart in SQL**

On successful completion, students will be able to

- transfer previously-acquired knowledge about database methods and approaches to practical use cases.
- design, architect, and implement a working data-mart solution.
- reason about design choices of and trade-offs between relevant implementation alternatives.
- critically evaluate said choices with respect to the stated design goal.
- describe and explain the resulting solution.



**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

## Database Modeling and Database Systems

Course Code: DLBCSDMDS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

Stored data form the basis of many value chains of an information and knowledge society. The methodical structuring of data through data schemas therefore forms an important basis for storing information in such a way that it can be retrieved and processed quickly and easily. In addition to the structured storage of data, structured access to large amounts of data must also be possible. This course teaches students how to store data in relational data models and how to access stored data with SQL. In addition to relational database systems, modern DB systems (NoSQL) for storing and accessing data will be presented.

### Course Outcomes

On successful completion, students will be able to

- describe the basic concepts of the relational data model and distinguish them from each other.
- visually model data schemas.
- know SQL queries, read data from databases, change the data stock, and have experience in their use.
- design, create, and modify SQL queries and data schemas for SQL databases, and have experience using them.
- independently design database schemas and create database queries to solve concrete problems.
- know the most important NoSQL concepts and distinguish them from each other.

### Contents

1. Fundamentals of Relational Databases
  - 1.1 Basic Concepts of the Relational Data Model
  - 1.2 Find and Delete Records in the Database
  - 1.3 SQL and Relational Database Systems
2. Querying Data from a Single Table
  - 2.1 Query Data (SELECT)
  - 2.2 Query Data With Condition (WHERE)
  - 2.3 Sort Query Output (ORDER BY)
  - 2.4 Queries With Group Formation (GROUP BY)
  - 2.5 Subqueries With Nested SELECT Statements

3. Conception and Modeling of Relational Databases
  - 3.1 The Entity Relationship Model
  - 3.2 Relationships and Cardinalities in E/R Models
  - 3.3 Normal Forms of Databases
4. Creation of Relational Databases
  - 4.1 Logical Database Design Activities
  - 4.2 Mapping of the Conceptual Data Model into the Physical Data Model
  - 4.3 Generation of Tables in SQL Databases from E/R Diagrams
5. Complex Database Queries on Multiple Tables
  - 5.1 Composite Quantities (JOIN)
  - 5.2 Set Operations
  - 5.3 Data Views With CREATE VIEW
6. Manipulating Records in Databases
  - 6.1 Insert New Data Records (INSERT)
  - 6.2 Change Existing Records
  - 6.3 Transactions
7. NoSQL Database Systems
  - 7.1 Motivation and Basic Idea
  - 7.2 Selected Groups of NoSQL Systems

**Literature****Compulsory Reading****Further Reading**

- Edlich, S./Friedland, A./Hampe, J./Brauer, B./Brückner, M. (2011): NoSQL. Einstieg in die Welt nichtrelationaler Web 2.0 Datenbanken. 2. Auflage, Hanser, München.
- Throll, M/Bartosch, O. (2010): Einstieg in SQL. Verstehen, einsetzen, nachschlagen. 4. Auflage, Galileo Computing, Bonn.
- Steiner, R. (2017): Grundkurs Relationale Datenbanken. Einführung in die Praxis der Datenbankentwicklung für Ausbildung, Studium und IT-Beruf. 9. Auflage, Springer Vieweg, Wiesbaden.
- Unterstein, M./Matthiessen, G. (2013): Anwendungsentwicklung mit Datenbanken. 5. Auflage, Springer Vieweg, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Project: Build a Data Mart in SQL

Course Code: DLBDSPBDM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

This course provides the opportunity to implement a realistic database use case scenario. A list of use case ideas is provided on the online learning platform. In addition, the students can contribute use case ideas of their own in accord with the tutor. The core aim is to apply the hitherto theoretical knowledge of database methods and approaches to solve a real-world application scenario. This entails reasoning about possible design and architectural choices in a rational way, as well as implementing them in a functioning database system.

### Course Outcomes

On successful completion, students will be able to

- transfer previously-acquired knowledge about database methods and approaches to practical use cases.
- design, architect, and implement a working data-mart solution.
- reason about design choices of and trade-offs between relevant implementation alternatives.
- critically evaluate said choices with respect to the stated design goal.
- describe and explain the resulting solution.

### Contents

- In this course, students apply their knowledge of data modeling and databases to implement a project use case of their choosing. All relevant artefacts, like use case evaluation, chosen implementation method, code, and outcomes, are documented in the form of a written project report.

**Literature****Compulsory Reading****Further Reading**

- Date, C. J. (2012). Database design and relational theory. Sebastopol, CA: O'Reilly.
- DeBarros, A. (2018). Practical SQL: A beginner's guide to storytelling with data. San Francisco, CA: No Starch Press.
- Harrington, J. L. (2016). Relational database design and implementation (4th ed.). Burlington, MA: Morgan Kaufmann.
- Hernandez, M. J. (2013). Database design for mere mortals: A hands-on guide to relational database design (3rd ed.). Boston, MA: Addison-Wesley.
- Viescas, J. (2018). SQL queries for mere mortals: A hands-on guide to data manipulation in SQL (4th ed.). Boston, MA: Addison-Wesley.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> yes
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSPBDM01



## Business Intelligence

Module Code: DLBCSEBI

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Sebastian Werning (Business Intelligence) / Prof. Dr. Sebastian Werning (Project: Business Intelligence)

### Contributing Courses to Module

- Business Intelligence (DLBCSEBI01)
- Project: Business Intelligence (DLBCSEBI02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Business Intelligence

- Study Format "Distance Learning": Exam, 90 Minutes

##### Project: Business Intelligence

- Study Format "Distance Learning": Written Assessment: Project Report

### Weight of Module

see curriculum

**Module Contents****Business Intelligence**

- Basics of mobile software development
- Android system architecture
- Development environment
- Core components of an Android app
- Interaction between application components
- Advanced techniques

**Project: Business Intelligence**

Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task.

**Learning Outcomes****Business Intelligence**

On successful completion, students will be able to

- explain the motivation, use cases, and basics of Business Intelligence.
- identify and explain techniques and methods for providing and modeling data, as well as types of data relevant to BI, differentiating between them.
- explain techniques and methods for the generation and storage of information and independently select suitable methods on the basis of concrete requirements.

**Project: Business Intelligence**

On successful completion, students will be able to

- independently design a solution to a practical problem in the field of Business Intelligence in order to then implement a prototype and document the results.
- identify and explain typical problems and challenges in the design and practical implementation of small BI solutions.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Computer Science & Software Development

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Business Intelligence

Course Code: DLBCSEBI01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Business Intelligence (BI) is used to obtain information from company data that is relevant for targeted corporate management and the optimization of business activities. This course introduces and discusses techniques, procedures, and models for data provision, information generation, and analysis, as well the distribution of the information obtained. You will then be able to explain the various subject areas of data warehousing and independently select methods and techniques to meet specific requirements.

## Course Outcomes

On successful completion, students will be able to

- explain the motivation, use cases, and basics of Business Intelligence.
- identify and explain techniques and methods for providing and modeling data, as well as types of data relevant to BI, differentiating between them.
- explain techniques and methods for the generation and storage of information and independently select suitable methods on the basis of concrete requirements.

## Contents

1. Motivation and Conceptualization
  - 1.1 Motivation and Historical Development
  - 1.2 BI as a Framework
2. Data Provision
  - 2.1 Operative and Dispositive Systems
  - 2.2 The Data Warehouse Concept
  - 2.3 Architectural Variations
3. Data Warehouse
  - 3.1 ETL Process
  - 3.2 DWH and Data Mart
  - 3.3 ODS and Metadata

4. Modelling of Multidimensional Data Spaces
  - 4.1 Data Modeling
  - 4.2 OLAP Cubes
  - 4.3 Physical Storage
  - 4.4 Star and Snowflake Scheme
  - 4.5 Historicization
5. Analysis Systems
  - 5.1 Free Data Research and OLAP
  - 5.2 Reporting Systems
  - 5.3 Model-Based Analysis Systems
  - 5.4 Concept-Oriented Systems
6. Distribution and Access
  - 6.1 Information Distribution
  - 6.2 Information Access

**Literature****Compulsory Reading****Further Reading**

- Bachmann, R./Kemper, G. (2011): Raus aus der BI-Falle. Wie Business Intelligence zum Erfolg wird. 2. Auflage, mitp, Heidelberg.
- Bauer, A./Günzel, H. (2008): Data Warehouse Systeme. Architektur, Entwicklung, Anwendung. 3. Auflage, dpunkt.verlag, Heidelberg.
- Betz, R. (2015): Werde Jäger des verlorenen Schatzes. In: Immobilienwirtschaft, Heft 5, S. 1614–1164. (URL <https://www.haufe.de/download/immobilienwirtschaft-ausgabe-052015-immobilienwirtschaft-fachmagazin-fuer-management-recht-praxis-303530.pdf> [letzter Zugriff: 27.02.2017]).
- Bodendorf, F. (2006): Daten- und Wissensmanagement. 2. Auflage, Springer, Berlin.
- Chamoni, P./Gluchowski, P. (Hrsg.) (2006): Analytische Informationssysteme Business Intelligence-Technologien und -Anwendungen. Springer, Berlin.
- Engels, C. (2008): Basiswissen Business Intelligence. W3L, Herdecke/Witten.
- Gansor, T./Totok, A./Stock, S. (2010): Von der Strategie zum Business Intelligence Competency Center (BICC). Konzeption – Betrieb – Praxis. Hanser, München.
- Gluchowski, P./Gabriel, R./Dittmar, C. (2008): Management Support Systeme und Business Intelligence. Computergestützte Informationssysteme für Fach- und Führungskräfte. 2. Auflage, Springer, Berlin/Heidelberg.
- Grothe, M. (2000): Business Intelligence. Aus Informationen Wettbewerbsvorteile gewinnen. Addison-Wesley, München.
- Gutenberg, E. (1983): Grundlagen der Betriebswirtschaft, Band 1. Die Produktion. 18. Auflage, Springer, Berlin/Heidelberg/New York.
- Hannig, U. (Hrsg.) (2002): Knowledge Management und Business Intelligence. Springer, Berlin.
- Hansen, H.-R./Neumann, G. (2001): Wirtschaftsinformatik I. Grundlagen betrieblicher Informationsverarbeitung. 8. Auflage, Lucius & Lucius UTB, Stuttgart.
- Humm, B./Wietek, F. (2005): Architektur von Data Warehouses und Business Intelligence Systemen. In: Informatik Spektrum, S. 3–14. (URL: [https://www.fbi.h-da.de/fileadmin/personal/b.humm/Publikationen/Humm\\_\\_Wietek\\_-\\_Architektur\\_DW\\_\\_Informatik-Spektrum\\_2005-01\\_.pdf](https://www.fbi.h-da.de/fileadmin/personal/b.humm/Publikationen/Humm__Wietek_-_Architektur_DW__Informatik-Spektrum_2005-01_.pdf) [letzter Zugriff: 27.02.2017]).
- Kemper, H.-G./Baars, H./Mehanna, W. (2010): Business Intelligence – Grundlagen und praktische Anwendungen. Eine Einführung in die IT-basierte Managementunterstützung. 3. Auflage, Vieweg+Teubner, Stuttgart.
- Turban, E. et al. (2010): Business Intelligence. A Managerial Approach. 2. Auflage, Prentice Hall, Upper Saddle River (NJ).

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Business Intelligence

Course Code: DLBCSEBI02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

Using well-known methods and techniques from the field of Business Intelligence, students will work independently on a practical question in this course. At the end of the course you will be able to independently design and prototype Business Intelligence applications based on concrete requirements.

### Course Outcomes

On successful completion, students will be able to

- independently design a solution to a practical problem in the field of Business Intelligence in order to then implement a prototype and document the results.
- identify and explain typical problems and challenges in the design and practical implementation of small BI solutions.

### Contents

- Implementation and documentation of practical questions regarding the use of Business Intelligence applications. Typical scenarios are, for example, "Management of BI projects", "Design of multidimensional data models" and "Prototypical implementation of small BI applications".

### Literature

#### Compulsory Reading

#### Further Reading

- Brenner, W./Uebernicketel, F. (2015): Design Thinking. Das Handbuch. Frankfurter Allgemeine Buch, Frankfurt a. M.
- Brown, T. (2008): Design Thinking. In: Harvard Business Review, Heft Juni, S. 84–95.
- Meinel, C./Weinberg, U./Krohn, T. (Hrsg.) (2015): Design Thinking Live. Wie man Ideen entwickelt und Probleme löst. Murmann, Hamburg.
- Uebernicketel, F./Brenner, W. (2016): Design Thinking. In: Hoffmann, C. P. et al. (Hrsg.): Business Innovation: Das St. Galler Modell. Springer, Wiesbaden, S. 243–265.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed



## Data Analyst

Module Code: DLBDEDA

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

N.N. (Advanced Data Analysis) / N.N. (Project: Data Analysis)

### Contributing Courses to Module

- Advanced Data Analysis (DLBDEDA01)
- Project: Data Analysis (DLBDEDA02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Advanced Data Analysis

- Study Format "Distance Learning": Exam, 90 Minutes

##### Project: Data Analysis

- Study Format "Distance Learning": Portfolio

### Weight of Module

see curriculum

**Module Contents****Advanced Data Analysis**

- Business performance analytics
- Text mining
- Web- and social media analytics
- Experimentation and testing

**Project: Data Analysis**

Transfer of methodological knowledge to the implementation of real-world analytics use cases from the above-mentioned problem domains.

**Learning Outcomes****Advanced Data Analysis**

On successful completion, students will be able to

- identify important design considerations for business KPIs.
- explain various topics in business process analytics.
- utilize established techniques for web data analytics.
- understand analytical approaches to text mining and semantic analysis.
- disambiguate relevant questions in social media analytics.
- use the techniques and methods for experimentation and testing.

**Project: Data Analysis**

On successful completion, students will be able to

- formulate and implement a real-world analytical use case.
- analyze the suitability of different possible approaches with respect to the project task.
- transfer acquired specialized analytical knowledge to real-world use cases.
- derive relevant design choices from the given project setting.
- make apposite choices with respect to implementation alternatives.
- select appropriate resources

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Advanced Data Analysis

Course Code: DLBDEDA01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course introduces several advanced analytics subjects of practical relevance. The subject areas covered span from business performance measurement and analytics, text mining, and web- and social media analytics to current trends in experimental design and setup. Along this journey topics such as the design of key performance indicators (KPIs), business process analytics, word frequency and semantic analysis, data science on clickstreams, social media interactions, and multi-armed bandit testing are addressed.

## Course Outcomes

On successful completion, students will be able to

- identify important design considerations for business KPIs.
- explain various topics in business process analytics.
- utilize established techniques for web data analytics.
- understand analytical approaches to text mining and semantic analysis.
- disambiguate relevant questions in social media analytics.
- use the techniques and methods for experimentation and testing.

## Contents

1. Business Performance Analytics
  - 1.1 KPI design considerations
  - 1.2 Common business performance indicators
  - 1.3 Business process mining
2. Text Analytics
  - 2.1 Word and document frequency (TF-IDF)
  - 2.2 Semantic analysis
3. Web Analytics
  - 3.1 Web metrics
  - 3.2 Clickstream analytics
  - 3.3 Recommender systems

4. Social Network Mining
  - 4.1 Introduction to social media analytics
  - 4.2 Mining common social media platforms
5. Testing and Experimentation
  - 5.1 Practical A/B testing
  - 5.2 Multivariate tests
  - 5.3 Multi-armed bandit testing

**Literature****Compulsory Reading****Further Reading**

- Hapke, H. / Howard, C. / Lane, H. (2019): Natural language processing in action.: Manning Publications, Shelter Island, NY.
- Kaushik, A. (2009): Web analytics 2.0: The art of online accountability and science of customer centricity. Sybex, Hoboken, NJ.
- Klassen, M. / Russell, M. A. (2019): Mining the social web. 3rd edition. O'Reilly Media, Sebastopol, CA.
- Marr, B. (2012): Key Performance Indicators (KPI). Pearson, Boston, MA.
- Neely, A. (Ed.) (2011): Business performance measurement: Unifying theory and integrating practice. 2nd edition, Cambridge University Press, Cambridge.
- Ojeda, T. / Bilbro, R. / Bengfort, B. (2018): Applied text analysis with Python. O'Reilly Media, Sebastopol, CA.
- Parmenter, D. (2015): Key performance indicators: Developing, implementing, and using winning KPIs. 3rd edition, John Wiley & Sons, Chichester.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Data Analysis

Course Code: DLBDSEDA02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The focus of this course is the implementation of a real-world, advanced analytics use case in the form of a student project. Primary subject areas for this practical work include business performance analytics, text mining, web- and social analytics, and experimentation and testing. The goal is for students to demonstrate they can transfer the theoretical knowledge acquired in Advanced Data Analysis (DLBDSEDA01) to an implementation scenario that closely mimics project work in a professional data science setting.

### Course Outcomes

On successful completion, students will be able to

- formulate and implement a real-world analytical use case.
- analyze the suitability of different possible approaches with respect to the project task.
- transfer acquired specialized analytical knowledge to real-world use cases.
- derive relevant design choices from the given project setting.
- make apposite choices with respect to implementation alternatives.
- select appropriate resources

### Contents

- This course covers the practical implementation of the approaches and techniques covered in the course Advanced Data Analysis (DLBDSEDA01) in a project-oriented setting. Each participant must produce a project report detailing and documenting their work. Project tasks are chosen from a list or suggested by the students in accord with the tutor.

**Literature****Compulsory Reading****Further Reading**

- Hapke, H. / Howard, C. / Lane, H. (2019): Natural language processing in action.: Manning Publications, Shelter Island, NY.
- Kaushik, A. (2009): Web analytics 2.0: The art of online accountability and science of customer centricity. Sybex, Hoboken, NJ.
- Klassen, M. / Russell, M. A. (2019): Mining the social web. 3rd edition. O'Reilly Media, Sebastopol, CA.
- Marr, B. (2012): Key Performance Indicators (KPI). Pearson, Boston, MA.
- Neely, A. (Ed.) (2011): Business performance measurement: Unifying theory and integrating practice. 2nd edition, Cambridge University Press, Cambridge.
- Ojeda, T. / Bilbro, R. / Bengfort, B. (2018): Applied text analysis with Python. O'Reilly Media, Sebastopol, CA.
- Parmenter, D. (2015): Key performance indicators: Developing, implementing, and using winning KPIs. 3rd edition, John Wiley & Sons, Chichester.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed



## Augmented, Mixed and Virtual Reality

Module Code: DLBMIAMVR\_E

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Augmented, Mixed and Virtual Reality) / N.N. (X-Reality Project)

### Contributing Courses to Module

- Augmented, Mixed and Virtual Reality (DLBMIAMVR01\_E)
- X-Reality Project (DLBMIAMVR02\_E)

### Module Exam Type

#### Module Exam

#### Split Exam

Augmented, Mixed and Virtual Reality

- Study Format "Distance Learning": Exam, 90 Minutes

X-Reality Project

- Study Format "Distance Learning": Written Assessment: Project Report

### Weight of Module

see curriculum

**Module Contents****Augmented, Mixed and Virtual Reality**

- Definition and Differentiation of Terms
- Fields of Application and Examples
- Aspects of Human Perception
- Augmented and Virtual Reality Output Devices
- Input Devices
- Interaction in Virtual and Augmented Realities
- Aspects of XR Application Development
- Future of XR Technologies

**X-Reality Project**

Development of AR-/VR-Application; Design, Implementation and Documentation; Challenges and Problems

**Learning Outcomes****Augmented, Mixed and Virtual Reality**

On successful completion, students will be able to

- name the characteristics and differences of augmented, mixed, and virtual reality techniques.
- describe the importance of sensual perception in AR and VR.
- explain the basic technical features of AR and VR systems.
- explain the different interaction possibilities in AR and VR applications.
- perform selected development processes for AR and VR applications.

**X-Reality Project**

On successful completion, students will be able to

- implement a small AR/VR application by themselves.
- experiment with the concept of AR/VR applications.
- discuss challenges and issues in AR/VR software development.
- document the concept and implementation of independently developed AR/VR applications and accumulated experience in a project report.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Computer Science & Software Development

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Augmented, Mixed and Virtual Reality

Course Code: DLBMIAMVR01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Augmented, mixed and virtual reality (AR, MR and VR) technologies are becoming increasingly important in a wide range of application areas. In this context, novel hardware devices and forms of interaction are used. In addition to the technical foundations, this course covers aspects of human perception and approaches for developing AR/VR applications. To give the students a knowledge of the field, the terms augmented, mixed, and virtual reality will be defined and differentiated and examples of their use will be demonstrated. In order to simulate the existence of a virtual world or virtual objects to users, aspects of human perception have to be used. Based on the fundamentals of human information processing, the course highlights the phenomena, problems, and solutions that have to be considered in AR and VR applications. AR and VR systems can be implemented in different ways. This course addresses different output forms, tracking methods and interaction possibilities. In addition, other techniques that are specifically relevant in the AR field will be represented. Software development in the AR and VR field may require the application of special processes. This course teaches selected approaches that are helpful in designing, prototyping, and testing AR and VR applications. The course concludes with a view at the future applications and the research potential of augmented, mixed, and virtual reality.

## Course Outcomes

On successful completion, students will be able to

- name the characteristics and differences of augmented, mixed, and virtual reality techniques.
- describe the importance of sensual perception in AR and VR.
- explain the basic technical features of AR and VR systems.
- explain the different interaction possibilities in AR and VR applications.
- perform selected development processes for AR and VR applications.

## Contents

1. Introduction to Augmented, Mixed and Virtual Reality
  - 1.1 Definition and Differentiation of Terms
  - 1.2 Fields of Application and Examples

2. Aspects of Human Perception
  - 2.1 Human Information Processing
  - 2.2 Visual Perception
  - 2.3 Multisensory Perception
  - 2.4 Phenomena, Problems and Solutions
3. Virtual Reality Output Devices
  - 3.1 Mounts for Smartphones
  - 3.2 Simple 3-Degrees-of-Freedom VR Glasses
  - 3.3 6-Degrees-of-Freedom-VR
  - 3.4 Multisensor Technology
4. Augmented Reality Output Devices
  - 4.1 Tracking
  - 4.2 Optical See-Through vs. Video See-Through vs. Projection
  - 4.3 General Differences between Devices
5. Input Devices
  - 5.1 Controller and Other Devices
  - 5.2 Touchpads
  - 5.3 Voice Commands
  - 5.4 Finger Tracking
  - 5.5 Eye Tracking
  - 5.6 Neurofeedback
6. Interaction in Virtual and Augmented Realities
  - 6.1 Fundamentals of Human-Computer Interaction
  - 6.2 Selection
  - 6.3 Manipulation of Objects
  - 6.4 Navigation
  - 6.5 Perceptual Variables
7. Aspects of Development
  - 7.1 Iterative Development Approaches for VR/AR Applications
  - 7.2 Design Techniques
  - 7.3 Prototyping
  - 7.4 Evaluation

8. The Future of Augmented, Mixed and Virtual Reality
  - 8.1 Outlook on Future Applications
  - 8.2 Focus Points for Future Research

## Literature

### Compulsory Reading

### Further Reading

- Billinghurst, M./Clark, A./Lee, G.: "A Survey of Augmented Reality". In: Foundations and Trends in Human-Computer Interaction, Vol. 8, Nr. 2-3, S.73-272.
- Jerald, J. (2016): The VR Book. Human-Centered Design for Virtual Reality. ACM und Morgan & Claypool.
- Schmalstieg, D./Höllner, T. (2016): Augmented Reality. Principles and Practice. Addison-Wesley.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## X-Reality Project

Course Code: DLBMIAMVR02\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The students create an application from the field of augmented or virtual reality by themselves and document its conception and implementation as well as collected experiences. The development of an AR/VR application may include special steps that are not known from classic software applications. In this context, AR- or VR-typical elements of the application should be explicitly highlighted and challenges and problems should be addressed.

### Course Outcomes

On successful completion, students will be able to

- implement a small AR/VR application by themselves.
- experiment with the concept of AR/VR applications.
- discuss challenges and issues in AR/VR software development.
- document the concept and implementation of independently developed AR/VR applications and accumulated experience in a project report.

### Contents

- The students work on a project from the field of augmented or virtual reality. They design and implement an AR/VR application based on a concrete task. The development of the application as well as collected experiences are documented in a project report. The project report first presents the project goal as well as the topic and context of the application. Then the requirements, the conception and the implementation of the application are described. During the documentation, AR- or VR-typical elements will be explicitly highlighted. The report concludes by highlighting the challenges and issues that arose during development.

### Literature

#### Compulsory Reading

#### Further Reading

- Buttfield-Addison, P., Manning, J., Nugent, T. (2019): Unity Game Development Cookbook: Essentials for Every Game. O'Reilly.
- Linowes, J. (2015): Unity virtual reality projects. Explore the world of virtual reality by building immersive and fun VR projects using Unity 3D. Packt Publishing.
- Linowes, J./Babilinski, K. (2017): Augmented Reality for Developers. Build practical augmented reality applications with Unity, ARCore, ARKit, and Vuforia. Packt Publishing.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed







# 6. Semester

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# International Marketing and Branding

Module Code: DLBDSEIMB

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

Caterina Fox (International Marketing ) / N.N. (International Brand Management)

## Contributing Courses to Module

- International Marketing (DLBDSEIMB01)
- International Brand Management (DLBDSEIMB02)

## Module Exam Type

### Module Exam

### Split Exam

#### International Marketing

- Study Format "Distance Learning": Exam, 90 Minutes

#### International Brand Management

- Study Format "Distance Learning": Module Exam (50)

## Weight of Module

see curriculum

**Module Contents****International Marketing**

- International marketing strategy
- Cultural differences and their significance for marketing
- International marketing mix (product, price, promotion, and distribution decisions in an international environment)
- International market research and consumer behavior
- Ethical aspects in international marketing
- International marketing controlling and six sigma

**International Brand Management**

- Basics of brand management
- Framework conditions for brands in international markets
- Strategies and concepts of international brands
- Brand architectures and brand extension options
- Brand management and communication
- Brand management according to the stakeholder concept
- Brand control and protection

**Learning Outcomes****International Marketing**

On successful completion, students will be able to

- understand basic aspects of international strategic marketing.
- analyze cultural differences and their impact on international marketing.
- apply selected concepts of the international marketing mix.
- describe the possibilities of international market research and its influence on consumer behavior.
- recognize the necessity of international brand controlling and quality management.
- reproduce theoretical knowledge using case studies.

**International Brand Management**

On successful completion, students will be able to

- recognize the significance of a brand and the general conditions under which brands operate, as well as the associated tasks of brand management.
- describe the components of a brand and its management.
- explain the positioning of brands on regional, national and international markets.
- understand the role of brand evaluation and compare the most common measurement techniques.
- give an overview of the importance of trademark protection and suggest strategies for preventing counterfeiting.
- conceive of brand strategies and measures for the avoidance or occurrence of brand crises.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Marketing & Sales

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Marketing & Communication fields

# International Marketing

Course Code: DLBDSEIMB01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Students are taught the necessity for strategic marketing in an international context. They will learn about essential cultural differences and their influences on international marketing management. The basic decisions, standardizations, and adaptations in international marketing are experienced by the students on the basis of different concepts in the international marketing mix. The necessity of international market research, strategic planning, and control are taught to the students, along with the ethical aspects in international marketing. The students analyze current topics in international marketing management and reflect on them in connection with the concepts they have learned in this course.

## Course Outcomes

On successful completion, students will be able to

- understand basic aspects of international strategic marketing.
- analyze cultural differences and their impact on international marketing.
- apply selected concepts of the international marketing mix.
- describe the possibilities of international market research and its influence on consumer behavior.
- recognize the necessity of international brand controlling and quality management.
- reproduce theoretical knowledge using case studies.

## Contents

1. Strategic International Marketing
  - 1.1 Internationalization
  - 1.2 Theoretical Foundations of International Market Entry Strategies
  - 1.3 Forms of International Market Entry
2. Cultural Differences as an Aspect of International Marketing
  - 2.1 Overview of Culture
  - 2.2 Cultural Model Based on Hofstede
  - 2.3 Cultural Model Based on Trompenaars



3. Case Studies in International Market Entry and Marketing Strategies
  - 3.1 Case Study: Nivea in South Korea
  - 3.2 Case Study: Bosch and Siemens Hausgeräte GmbH in China
  - 3.3 Case Study: Siemens Mobile in China
  - 3.4 Case Study: Siemens in China
4. International Product Management and Product Development
  - 4.1 Goals of International Product Management
  - 4.2 Framework Conditions for International Product Management
  - 4.3 International Product Decisions
  - 4.4 International Product Development
5. Exchange Rate Fluctuations and International Price Calculation
  - 5.1 Tasks and Objectives of International Price Management
  - 5.2 Factors Influencing International Price Management
  - 5.3 Instruments of International Price Management
6. International Communication and International Sales Policy
  - 6.1 International Communication Management
  - 6.2 International Sales Management
7. International Marketing and Ethics
  - 7.1 Overview of International Marketing and Ethics
  - 7.2 Business Ethics in International Companies
  - 7.3 Case Study: Nestlé
8. Applied Market Research and Its Influence on Consumer Behavior
  - 8.1 Scope of International Market Research
  - 8.2 Requirements for International Market Research Information
  - 8.3 International Secondary Research
  - 8.4 International Primary Research
9. Monitoring and Control in International Marketing
  - 9.1 Controlling in International Management
10. Six Sigma, Brand Management, and Rebranding
  - 10.1 Six Sigma: Basics, Definitions, and Processes
  - 10.2 Brand Management
  - 10.3 Rebranding

**Literature****Compulsory Reading****Further Reading**

- Backhaus, K./Voeth, M. (2010): Internationales Marketing. Schäffer-Poeschel Stuttgart.
- Berndt, R./Altobelli, C. F./Sander, M. (2010): Internationales Marketing-Management. 4. Auflage, Springer, Berlin.
- Homburg, C./Krohmer, H. (2009): Marketingmanagement. Strategie – Instrumente – Umsetzung – Unternehmensführung. 3. Auflage, Gabler, Wiesbaden.
- Horx, M. (2005): Wie wir leben werden. Unsere Zukunft beginnt jetzt. Campus, Frankfurt a. M.
- Kotabe, M./Helsen, K. (2008): Global Marketing Management. 4. Auflage, Wiley, Hoboken (NJ).
- Kotler, P./Keller K. L./Bliemel, F. (2007): Marketing-Management. Strategien für wertschaffendes Handeln. 12. Auflage, Pearson Studium, Stuttgart.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# International Brand Management

Course Code: DLBDSEIMB02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim of this course is to deepen and expand the knowledge acquired in the introductory elective course International Marketing. The value of a brand is a decisive competitive advantage for companies in international business. Brands create long-term and profitable customer relationships. Brands are therefore valuable assets for companies and organizations. Students learn the basics of brand management before moving on to the concepts and success factors of international brand management. Students also become familiar with the structure of brand architectures and the possibilities of brand extensions. The fact that different stakeholder groups must be taken into account in brand management is communicated to the students on the basis of the stakeholder concept. In addition, the students get to know the various methods for measuring brand value and brand controlling. The aspects of trademark protection that are particularly important in an international environment will be dealt with conclusively.

## Course Outcomes

On successful completion, students will be able to

- recognize the significance of a brand and the general conditions under which brands operate, as well as the associated tasks of brand management.
- describe the components of a brand and its management.
- explain the positioning of brands on regional, national and international markets.
- understand the role of brand evaluation and compare the most common measurement techniques.
- give an overview of the importance of trademark protection and suggest strategies for preventing counterfeiting.
- conceive of brand strategies and measures for the avoidance or occurrence of brand crises.

## Contents

1. Basics of Brand Management
  - 1.1 Brand Significance and Brand Understanding
  - 1.2 Market Conditions
  - 1.3 Tasks and Goals of Brand Management

2. Brand Identity, Brand Positioning, and Brand Personality
  - 2.1 Brand Identity as the Basis of Brand Management
  - 2.2 Brand Positioning
  - 2.3 Brand Image
  - 2.4 Brand Personality
3. Brand Strategies
  - 3.1 The Challenges for Brand Strategies
  - 3.2 Brand Strategies for New Products
  - 3.3 Trademark Licensing
4. International Branding
  - 4.1 Importance of Branding for International Companies
  - 4.2 Brand Concepts for International Brands
  - 4.3 Factors for Successful International Brands
5. Brand Architectures and Types of Branding
  - 5.1 Brand Systems
  - 5.2 Co-branding and Hybrid Branding
6. Brand Management and Communication
  - 6.1 Classic Brand Communication
  - 6.2 Brand Communication on the Internet
7. Brand Expansion
  - 7.1 Basics of Brand Expansion
  - 7.2 Opportunities and Risks of Brand Expansion
  - 7.3 Ideal Typical Sequence of the Brand Expansion Process
8. Brand Management According to the Stakeholder Concept
  - 8.1 Basics of Brand Management According to the Stakeholder Principle
  - 8.2 Stakeholder Groups: Consumer Stakeholder Groups
  - 8.3 Stakeholder Groups: Shareholders and Financial Investors
  - 8.4 Stakeholder Groups: Employees
  - 8.5 Stakeholder Groups: Suppliers and the Public

9. Brand Control
  - 9.1 Basics of Brand Controlling
  - 9.2 Importance and Measurement of Brand Value (Brand Status Analyses)
  - 9.3 Practical Methods for Measuring Brand Value
10. Trademark Protection
  - 10.1 Object of Trademark Protection
  - 10.2 Origin of Trademark Protection
  - 10.3 Trademark Infringements

## Literature

### Compulsory Reading

### Further Reading

- Baumgarth, C. (2008): Markenpolitik. Markenwirkungen – Markenführung – Markencontrolling. 3. Auflage, Gabler, Wiesbaden.
- Berndt, R./Altobelli, C. F./Sander, M. (2010): Internationales Marketing-Management. 4. Auflage, Springer, Berlin.
- Esch, F.-R. (2010): Strategie und Technik der Markenführung. 6. Auflage, Vahlen, München.
- Gelder, S. v. (2003): Global Brand Strategy. Unlocking Brand Potential Across Countries, Cultures and Markets. Kogan Page, London.
- Homburg, C./Krohmer, H. (2009): Marketingmanagement. Strategie – Instrumente – Umsetzung – Unternehmensführung. 3. Auflage, Gabler, Wiesbaden.
- Keller, K. L. (2007): Strategic Brand Management. Building, Measuring and Managing Brand Equity. 3. Auflage, Prentice Hall International, Edinburgh.
- Kotler, P./Keller K. L./Bliemel, F. (2007): Marketing-Management. Strategien für wertschaffendes Handeln. 12. Auflage, Pearson Studium, Stuttgart.
- Meffert, H./Burmans, C./Koers, M. (Hrsg.) (2005): Markenmanagement. Identitätsorientierte Markenführung und praktische Umsetzung. 2. Auflage, Gabler, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEIMB02



## Applied Sales

Module Code: DLBDSEAS

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

Prof. Dr. Patrick Geus (Applied Sales I) / Prof. Dr. Patrick Geus (Applied Sales II)

### Contributing Courses to Module

- Applied Sales I (DLBDSEAS01)
- Applied Sales II (DLBDSEAS02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Applied Sales I

- Study Format "Distance Learning": Exam

##### Applied Sales II

- Study Format "Distance Learning": Exam

### Weight of Module

see curriculum

### **Module Contents**

#### **Applied Sales I**

- Fundamentals of Applied Sales
- The Distribution System
- Personal Sales
- Sales Plans
- New Customer Acquisition
- A Sales Visit
- Conversational Tactics
- Conducting Negotiations
- Other Sales Channels

#### **Applied Sales II**

- Marketing and Sales
- Customer Satisfaction as a Success Factor
- Personalities in Sales
- Customer-Oriented Communication
- Presentation and Rhetoric
- Customer Loyalty
- Networking
- Case Study

**Learning Outcomes****Applied Sales I**

On successful completion, students will be able to

- understand the fundamentals of applied sales and place them in the context of the company.
- understand the interaction of the individual facets of applied sales.
- differentiate between and evaluate individual sales systems.
- describe current sales types and sales characteristics.
- oversee and classify the entire sales process from customer acquisition to customer retention.
- understand the basics of sales and negotiation management and apply them.
- name the usual sales instruments, recognize their advantages and disadvantages, and reflect on essential fields of application and possibilities.

**Applied Sales II**

On successful completion, students will be able to

- understand the interaction and the respective areas of responsibility of marketing and sales.
- reflect on and classify the goals and measures within the framework of the applied sales system.
- assess the relevance of customer satisfaction and retention. In addition, the students will be familiar with the central design elements of CRM.
- reflect on and assess alternative approaches to customer loyalty and relationship management and apply them in business practice.
- understand the meaning of the terms customer life cycle and customer value, and develop approaches to manage them in the sense of the respective sales targets.
- use descriptive presentation techniques in order to convince customers and other sales partners.
- understand the relevance of networking and develop strategies to broaden the contact base.
- develop and evaluate their own market analyses and sales concepts on the basis of practical experience within the framework of the case study.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Marketing & Sales

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Marketing & Communication fields

## Applied Sales I

Course Code: DLBDSEAS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The demands on sales thinking are growing every day. Globalized demand combined with high competition is making it increasingly difficult for companies to compete for customers. At the same time, customers are becoming better informed, while traditional supply markets are saturated and at overcapacity. In order to be successful in such an environment, sales thinking and action are required along with a new type of salesperson. Within the course Applied Sales I (Introduction), the participants are familiarized with the basic concepts of applied sales. You will learn about sales organization, dealing with alternative sales channels, and get to know the dedicated sales planning process. The contents of the module are complemented by the successful acquisition of new customers, whereby particular attention is paid to the organization and implementation of customer visits and the conduct of discussions and negotiations.

### Course Outcomes

On successful completion, students will be able to

- understand the fundamentals of applied sales and place them in the context of the company.
- understand the interaction of the individual facets of applied sales.
- differentiate between and evaluate individual sales systems.
- describe current sales types and sales characteristics.
- oversee and classify the entire sales process from customer acquisition to customer retention.
- understand the basics of sales and negotiation management and apply them.
- name the usual sales instruments, recognize their advantages and disadvantages, and reflect on essential fields of application and possibilities.

### Contents

1. Fundamentals of Applied Sales and Distribution
  - 1.1 Tasks and Forms of Applied Distribution
  - 1.2 Marketing as the Basis of Sales
  - 1.3 Distribution, Sales, and Other Terms
  - 1.4 Sales in Different Economic Sectors

2. The Distribution System
  - 2.1 Forms of Sales
  - 2.2 Sales Organisation
  - 2.3 Key Account Management
  - 2.4 Multi-Channel Distribution
3. Personal Sales
  - 3.1 The "New Sellers"
  - 3.2 Requirements for Sales Personalities
  - 3.3 The Key Account Manager
  - 3.4 Task of Sales Managers
4. Sales Plan
  - 4.1 Tasks and Objectives of Sales Management
  - 4.2 Observation of Competition in the Context of Sales Management
  - 4.3 Potential Analyses and Sales Planning
  - 4.4 Sales Control and Visit Strategies
5. New Customer Acquisition
  - 5.1 Identification of New Customer Potential
  - 5.2 Customer Relationship Management and Customer Acquisition
  - 5.3 Trade Fairs and Events
  - 5.4 Networking
6. The Sales Visit
  - 6.1 Frequency and Preparation of Visits
  - 6.2 Conduct of a Visit
  - 6.3 Visit Reports and Follow-Up
  - 6.4 Aftercare and Follow-Up
7. Conversational Tactics
  - 7.1 Structured Conversation Preparation
  - 7.2 Goal-Oriented Conversation: The D.A.L.A.S Model
  - 7.3 Questioning Techniques

8. Conducting Negotiations
  - 8.1 Psychology of Negotiation
  - 8.2 Negotiation Structure
  - 8.3 Objection Handling
  - 8.4 Price Negotiations
  
9. Other Sales Channels
  - 9.1 Telemarketing
  - 9.2 Catalogue and Brochure Sales
  - 9.3 Internet and E-Commerce

**Literature****Compulsory Reading****Further Reading**

- Dannenberg, H./Zupancic, D. (2010): Spitzenleistungen im Vertrieb. Optimierungen im Vertriebs- und Kundenmanagement. 2. Auflage, Gabler, Wiesbaden.
- Eicher, H. (2006): Die geheimen Spielregeln im Verkauf. Wissen, wie der Kunde tickt. Campus, Frankfurt a. M.
- Herndl, K. (2014): Führen im Vertrieb. So unterstützen Sie Ihre Mitarbeiter direkt und konsequent. 4. Auflage, Gabler, Wiesbaden.
- Limbeck, M. (2016): Das neue Hardselling. Verkaufen heißt verkaufen – So kommen Sie zum Abschluss. 6. Auflage, Gabler, Wiesbaden.
- Schneider, W./Henning, A. (2008): Lexikon Kennzahlen für Marketing und Vertrieb. Das Marketing-Cockpit von A – Z. 2. Auflage, Springer, Berlin/Heidelberg.
- Winkelmann, P. (2012): Marketing und Vertrieb. Fundamente für die Marktorientierte Unternehmensführung. 8. Auflage, Oldenbourg, München.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Applied Sales II

Course Code: DLBDSEAS02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The course Applied Sales II builds on the basics taught in the course "Applied Sales I" and broadens and deepens them. First, the tension between marketing and sales is examined in more detail. Based on this, essential backgrounds and central target figures for successful sales management (e.g., customer satisfaction and loyalty as well as the customer life cycle) are derived and operationalized in order to create the basis for efficient and effective customer relationship management. As the process progresses, attention will also be paid to mental processes and consumer behavior in general. In addition, strategies and paths to successful negotiation are deepened and supplemented by convincing communication techniques. The course concludes with a case study in the course of which the students have the opportunity to apply what they have learned in a practice-oriented manner.

### Course Outcomes

On successful completion, students will be able to

- understand the interaction and the respective areas of responsibility of marketing and sales.
- reflect on and classify the goals and measures within the framework of the applied sales system.
- assess the relevance of customer satisfaction and retention. In addition, the students will be familiar with the central design elements of CRM.
- reflect on and assess alternative approaches to customer loyalty and relationship management and apply them in business practice.
- understand the meaning of the terms customer life cycle and customer value, and develop approaches to manage them in the sense of the respective sales targets.
- use descriptive presentation techniques in order to convince customers and other sales partners.
- understand the relevance of networking and develop strategies to broaden the contact base.
- develop and evaluate their own market analyses and sales concepts on the basis of practical experience within the framework of the case study.



**Contents**

1. Marketing and Sales
  - 1.1 Marketing Tasks and Functions
  - 1.2 Sales Marketing in Different Economic Sectors
  - 1.3 Relationship Marketing
  - 1.4 International Marketing and Sales Cooperations
2. Customer Satisfaction as a Success Factor
  - 2.1 Customer Relationship Management (CRM)
  - 2.2 The CRM Success Chain
  - 2.3 Customer Relationship Strategies
3. Personalities in Sales
  - 3.1 Sales Personalities and Differentiation
  - 3.2 Selling in Teams
  - 3.3 Negotiating With Committees
4. Customer-Oriented Communication
  - 4.1 Communication Tasks in Sales
  - 4.2 Sales Promotion by Sales Staff
  - 4.3 Team Sales Promotion
  - 4.4 Sales Promotion by the Company
5. Presentation and Rhetoric
  - 5.1 Rhetoric in Sales
  - 5.2 Presentation Techniques
  - 5.3 Nonverbal Communication
6. Customer Loyalty
  - 6.1 Customer Retention Management
  - 6.2 Customer Programs and Other Customer Loyalty Tools
  - 6.3 Complaint Management
7. Networking
  - 7.1 Network Competencies in the Company
  - 7.2 Building and Shaping Relationships
  - 7.3 Networking via Social Media

8. Case Study in IQ Media Marketing
  - 8.1 The Market Situation
  - 8.2 The Marketing Situation
  - 8.3 IQ Media Marketing and IQ Digital Media Marketing

### Literature

#### Compulsory Reading

#### Further Reading

- Dannenberg, H./Zupancic, D. (2010): Spitzenleistungen im Vertrieb. Optimierungen im Vertriebs- und Kundenmanagement. 2. Auflage, Gabler, Wiesbaden.
- Eicher, H. (2006): Die geheimen Spielregeln im Verkauf. Wissen, wie der Kunde tickt. Campus, Frankfurt a. M.
- Herndl, K. (2014): Führen im Vertrieb. So unterstützen Sie Ihre Mitarbeiter direkt und konsequent. 4. Auflage, Gabler, Wiesbaden.
- Limbeck, M. (2016): Das neue Hardselling. Verkaufen heißt verkaufen – So kommen Sie zum Abschluss. 6. Auflage, Gabler, Wiesbaden.
- Schneider, W./Henning, A. (2008): Lexikon Kennzahlen für Marketing und Vertrieb. Das Marketing-Cockpit von A – Z. 2. Auflage, Springer, Berlin/Heidelberg.
- Winkelmann, P. (2012): Marketing und Vertrieb. Fundamente für die Marktorientierte Unternehmensführung. 8. Auflage, Oldenbourg, München.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAS02

# Supply Chain Management

Module Code: DLBDESCM

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

N.N. (Supply Chain Management I ) / N.N. (Supply Chain Management II)

## Contributing Courses to Module

- Supply Chain Management I (DLBDESCM01)
- Supply Chain Management II (DLBDESCM02)

## Module Exam Type

### Module Exam

### Split Exam

#### Supply Chain Management I

- Study Format "Distance Learning": Module Exam (50)

#### Supply Chain Management II

- Study Format "Distance Learning": Module Exam (50)

## Weight of Module

see curriculum

### **Module Contents**

#### **Supply Chain Management I**

- Historical and terminological aspects of the SCM concept
- Motives for the creation of cross-company value creation networks
- Design principles and effects of value creation networks
- Logistical core processes and SCM
- Information technology aspects of the SCM concept
- Coordination and collaboration of the network partners
- Industry-specific solutions of the SCM

#### **Supply Chain Management II**

- Strategic aspects of SCM
- SCM Practice: Tasks and Activities in the Core Planning Process
- SCM Practice: Tasks and Activities in the Core Process of Procurement
- SCM Practice: Tasks and Activities in the Core Process Production
- SCM Practice: Tasks and Activities in the Core Distribution Process

**Learning Outcomes****Supply Chain Management I**

On successful completion, students will be able to

- explain the importance of cross-company value creation processes.
- understand common concepts for modeling cross-company value creation processes.
- understand dynamic effects in supply chains and can systematize their causes and effects.
- explain important theoretical concepts for describing the characteristics and challenges of cross-company value creation processes.
- explain the approaches and problem categories commonly used in the context of supply chain management.
- understand important reference and/or management models for the concretization of supply chain systems.
- name and detail important roles and tasks in the SCM network.
- deal with the coordination problem of SCM and describe the common solution approaches.

**Supply Chain Management II**

On successful completion, students will be able to

- systematically explain the strategic relevance of enterprise-wide value creation processes.
- understand the most important tasks and problems in the SCM core process planning.
- systematize the elements and interrelationships in the CPFR model in a differentiated way.
- be familiar with the characteristics and peculiarities of contract logistics.
- understand the most important tasks and problems in the SCM core process procurement.
- explain central elements and characteristics of a procurement strategy.
- understand the most important tasks and problems in the SCM core process production.
- explain central elements and characteristics of a modern production strategy.
- understand the most important tasks and problems in the SCM core process distribution.
- explain central elements and characteristics of the so-called ECR concept.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Logistics & Transportation

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Transport & Logistics fields

# Supply Chain Management I

Course Code: DLBDESESCM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

SCM proves to be an extremely multi-faceted construct from both a theoretical and a practical point of view. An adequate understanding of the problem dimensions and modes of action of (global) cross-company value creation networks requires a multidimensional approach. It starts by considering logistical processes, with modern process, flow, and network standards forming an important basis for SCM. On the basis of such an approach, students should gain a fundamental understanding of SCM. From the point of view of a holistic approach, it also makes sense to also examine a number of other typical problem areas in addition to the logistical challenges of this concept. This includes IT aspects of SCM (e.g., APS systems), and questions to do with the collaboration and coordination of network partners. This course also considers selected industry specific SCM solutions (ECR or VMI).

## Course Outcomes

On successful completion, students will be able to

- explain the importance of cross-company value creation processes.
- understand common concepts for modeling cross-company value creation processes.
- understand dynamic effects in supply chains and can systematize their causes and effects.
- explain important theoretical concepts for describing the characteristics and challenges of cross-company value creation processes.
- explain the approaches and problem categories commonly used in the context of supply chain management.
- understand important reference and/or management models for the concretization of supply chain systems.
- name and detail important roles and tasks in the SCM network.
- deal with the coordination problem of SCM and describe the common solution approaches.

## Contents

1. Fundamentals of the Supply Chain Concept
  - 1.1 Terminological and Conceptual Fundamentals
  - 1.2 Supply Chain Typology According to Otto
  - 1.3 Supply Chain Typology According to Bechtel/Jayaram
  - 1.4 Dynamic Aspects of Supply Chains



2. Selected Theoretical Concepts for the Supply Chain Concept
  - 2.1 New Institutional Economics
  - 2.2 Game Theory
  - 2.3 Network Approach
  - 2.4 Other Theoretical Additions
3. Supply Chain Management
  - 3.1 Basic Information on the Goals and Scope of SCM
  - 3.2 Popular Problem Areas of the SCM
  - 3.3 Supply Chain Management as an Evolutionary Step in Logistics
  - 3.4 Supply Chain Management as Cooperation Management
4. SCM Model
  - 4.1 Basic Information on the Term SCM Models
  - 4.2 SCOR Model
  - 4.3 SCM Task Model
5. SCM as a Coordination Problem
  - 5.1 Basic Information on the Concept of Coordination
  - 5.2 Coordination Concepts, Context, and Perspectives of SCM
  - 5.3 Coordination Instruments

**Literature****Compulsory Reading****Further Reading**

- Arndt, H. (2018): Supply Chain Management. Optimierung logistischer Prozesse. 7. Auflage, Gabler, Wiesbaden.
- Grosche, P. (2012): Konfiguration und Koordination von Wertschöpfungsaktivitäten in internationalen Unternehmen. Eine empirische Untersuchung in der Automobilindustrie. Gabler-Verlag, Wiesbaden.
- Heiserich, O.E./Helbig, K./Ullmann, W. (2011): Logistik. Eine praxisorientierte Einführung. 4. Auflage, Gabler-Verlag | Springer Fachmedien, Wiesbaden 2011.
- Hertel, J./Zentes, J./Schramm-Klein, H. (2011): Supply-Chain-Management und Warenwirtschaftssysteme im Handel. 2. Auflage, Springer Verlag, Heidelberg.
- Hungenberg, H. (2014): Strategisches Management in Unternehmen. Ziele-Prozesse-Verfahren. 8. Auflage, Wiesbaden.
- Pfohl, H. C. (2010): Logistiksysteme. Betriebswirtschaftliche Grundlagen. 8 Auflage, Springer, Berlin.
- Schulte, C. (2013): Logistik. Wege zur Optimierung der Supply Chain. 6. Auflage, Vahlen, München.
- Werner, H. (2013): Supply Chain Management. Grundlagen, Strategien, Instrumente und Controlling. 5. Auflage, Gabler, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Supply Chain Management II

Course Code: DLBDESESCM02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

From the perspective of strategic management research and practice, the activities covered by the term SCM are closely related to efforts to build and/or maintain a stable operational competitive advantage. A fundamental discussion of this relationship forms the starting point for the course. On this basis, a differentiated analysis of strategy-relevant activities and instruments in the Plan, Source, Make, Deliver, and Return process categories is then carried out using the SCOR model. Special attention is given to the practice-relevant areas of SCM, e.g., order-promising (plan), supplier-relation-management (source), postponement (make), and the ECR-concept (deliver).

### Course Outcomes

On successful completion, students will be able to

- systematically explain the strategic relevance of enterprise-wide value creation processes.
- understand the most important tasks and problems in the SCM core process planning.
- systematize the elements and interrelationships in the CPFR model in a differentiated way.
- be familiar with the characteristics and peculiarities of contract logistics.
- understand the most important tasks and problems in the SCM core process procurement.
- explain central elements and characteristics of a procurement strategy.
- understand the most important tasks and problems in the SCM core process production.
- explain central elements and characteristics of a modern production strategy.
- understand the most important tasks and problems in the SCM core process distribution.
- explain central elements and characteristics of the so-called ECR concept.

### Contents

1. Strategic Aspects of SCM
  - 1.1 Strategic Thinking and Action: General Information
  - 1.2 Competition Focus and SCM
  - 1.3 Competition Location and SCM
  - 1.4 Competition Rules and SCM

2. SCM Practice: Core Process Planning
  - 2.1 General Preliminary Considerations
  - 2.2 Collaborative Planning, Forecasting, and Replenishment
  - 2.3 Order Promoting
  - 2.4 Kanban
  - 2.5 Integration of X-PL Logistics Service Providers
3. SCM Practice: Core Process Procurement
  - 3.1 General Preliminary Considerations
  - 3.2 Production Synchronous Procurement
  - 3.3 Sourcing Concepts
  - 3.4 Supplier Relations Management
4. SCM Practice: Core Process Production
  - 4.1 Selected Aspects of the Problem Background
  - 4.2 Collaborative Engineering
  - 4.3 Postponement Strategies
  - 4.4 Value Added Partnership
5. SCM Practice: Core Process Distribution
  - 5.1 Basic Information on the Distribution Problem
  - 5.2 Efficient Consumer Response (ECR)
  - 5.3 Consignment Warehouse

**Literature****Compulsory Reading****Further Reading**

- Arndt, H. (2018): Supply Chain Management. Optimierung logistischer Prozesse. 7. Auflage, Gabler, Wiesbaden.
- Grosche, P. (2012): Konfiguration und Koordination von Wertschöpfungsaktivitäten in internationalen Unternehmen. Eine empirische Untersuchung in der Automobilindustrie. Gabler-Verlag, Wiesbaden.
- Heiserich, O.E./Helbig, K./Ullmann, W. (2011): Logistik. Eine praxisorientierte Einführung. 4. Auflage, Gabler-Verlag | Springer Fachmedien, Wiesbaden 2011.
- Hertel, J./Zentes, J./Schramm-Klein, H. (2011): Supply-Chain-Management und Warenwirtschaftssysteme im Handel. 2. Auflage, Springer Verlag, Heidelberg.
- Hungenberg, H. (2014): Strategisches Management in Unternehmen. Ziele-Prozesse-Verfahren. 8. Auflage, Wiesbaden.
- Pfohl, H. C. (2010): Logistiksysteme. Betriebswirtschaftliche Grundlagen. 8 Auflage, Springer, Berlin.
- Schulte, C. (2013): Logistik. Wege zur Optimierung der Supply Chain. 6. Auflage, Vahlen, München.
- Werner, H. (2013): Supply Chain Management. Grundlagen, Strategien, Instrumente und Controlling. 5. Auflage, Gabler, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDESCM02



## Financial Services Management

Module Code: DLBDSEFSM

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Financial Services Management I) / N.N. (Financial Services Management II)

### Contributing Courses to Module

- Financial Services Management I (DLBDSEFSM01)
- Financial Services Management II (DLBDSEFSM02)

### Module Exam Type

#### Module Exam

#### Split Exam

Financial Services Management I

- Study Format "Distance Learning": Module Exam (50)

Financial Services Management II

- Study Format "Distance Learning": Module Exam (50)

### Weight of Module

see curriculum

**Module Contents****Financial Services Management I**

- Financial Markets and Financial Intermediaries
- Financial Intermediation in Germany
- Financial Services
- Debt Financing Through Financial Intermediaries
- Equity Financing Through Financial Intermediaries

**Financial Services Management II**

- Fundamentals of the Monetary and Asset Situation
- Investment in Money
- Investment in Tangible Assets
- Investment Funds and Certificates
- Insurance Financial Services

**Learning Outcomes****Financial Services Management I**

On successful completion, students will be able to

- know the role of a financial service provider as a financier as well as how individual markets function in the financing sector.
- understand the basic relationships between the different financial services and their (supervisory) legal frameworks.
- evaluate the potential influence of the financial services sector on the real economy.
- familiarize themselves with the financing services offered both for external financing and for self-financing.
- assess the importance of financial services in the form of debt and equity financing in the short, medium, and long term.

**Financial Services Management II**

On successful completion, students will be able to

- systematize the different possibilities for the investment of financial surpluses.
- with the help of knowledge gained regarding conflicts involved in making financial investments, apply different aspects of investment decision-making to financial instruments.
- assess the various forms of investment in order of their safety.
- analyze the various forms of investment in terms of risk and return.
- understand that investment funds, certificates, and derivatives are modern products of financial service providers, which bring high returns and sometimes high risk.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Finance & Tax Accounting

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Business & Management fields

# Financial Services Management I

Course Code: DLBDSEFSM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The course explains the origin and constitution of the financial market. As a result of the imperfection of the financial market, the necessity of financial intermediaries is theoretically derived, which leads to the thesis of disintermediation. Since the German financial market is determined by regulations and supervision, the legal framework is discussed. The financial services of banks and other specialized financial intermediaries are presented. The main forms of debt financing through financial intermediaries are presented as well as financing with equity capital.

## Course Outcomes

On successful completion, students will be able to

- know the role of a financial service provider as a financier as well as how individual markets function in the financing sector.
- understand the basic relationships between the different financial services and their (supervisory) legal frameworks.
- evaluate the potential influence of the financial services sector on the real economy.
- familiarize themselves with the financing services offered both for external financing and for self-financing.
- assess the importance of financial services in the form of debt and equity financing in the short, medium, and long term.

## Contents

1. Financial Markets and Financial Intermediaries
  - 1.1 Origin and Basic Problems of the Financial Market
  - 1.2 Appearances and Functions of Financial Intermediaries
  - 1.3 The Thesis of Disintermediation in Finance
2. Financial Intermediation in Germany
  - 2.1 The Banking System in Germany
  - 2.2 Capital Management Companies and Insurance Companies
  - 2.3 Regulations and Supervision

3. Financial Services
  - 3.1 Financing Needs
  - 3.2 The Range of Financial Services
  - 3.3 Lending and Collateralization
4. Debt Financing Through Financial Intermediaries
  - 4.1 Short-Term Loans as a Financing Service
  - 4.2 Medium and Long-Term Loans as Financial Services
  - 4.3 Credit Substitutes
5. Equity Financing Through Financial Intermediaries
  - 5.1 Equity Financing Through Capital Participation and Venture Financing Companies
  - 5.2 Services in Connection With Issue Financing

**Literature****Compulsory Reading****Further Reading**

- Bitz, M./Stark, G. (2008): Finanzdienstleistungen. 8. Auflage, Oldenbourg, München/Wien.
- Brealey, R. A./Myers, S. C. (2010): Principles of Corporate Finance. 10. Auflage, McGraw-Hill, London.
- Copeland, T. E./Weston, J. F./Shastri, K. (2008): Finanzierungstheorie und Unternehmenspolitik. 4. Auflage, Pearson, München.
- Hartmann-Wendels, T./Pfungsten, A./Weber, M. (2006): Bankbetriebslehre. 4. Auflage, Springer, Berlin.
- Perridon, L./Steiner, M./Rathgeber, A. W. (2009): Finanzwirtschaft der Unternehmung. 15. Auflage, Vahlen, München.
- Wöhe, G. et al. (2009): Grundzüge der Unternehmensfinanzierung. 10. Auflage, Vahlen, München.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Financial Services Management II

Course Code: DLBDSEFSM02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

In this course, the different possibilities of investing financial surpluses are systematized. The conflicting relationship between the risks, returns, and liquidity of a financial investment are presented, and the different aspects of decision-making for investment in one of the financial instruments are shown. The various forms of investment (monetary values, tangible assets) are presented in the order of their security. The functions that insurance companies perform as financial service providers complete the picture. The different forms of life insurance and their role in old-age provision are presented.

### Course Outcomes

On successful completion, students will be able to

- systematize the different possibilities for the investment of financial surpluses.
- with the help of knowledge gained regarding conflicts involved in making financial investments, apply different aspects of investment decision-making to financial instruments.
- assess the various forms of investment in order of their safety.
- analyze the various forms of investment in terms of risk and return.
- understand that investment funds, certificates, and derivatives are modern products of financial service providers, which bring high returns and sometimes high risk.

### Contents

1. Basic Information on Investing Money and Assets
  - 1.1 Basic Concepts of Money and Asset Investment
  - 1.2 Framework Conditions for Decisions on Plants
  - 1.3 Investment Products
2. Investment in Money
  - 2.1 Investment in Accounts
  - 2.2 Savings Bonds
  - 2.3 Fixed-Interest Securities

3. Investment in Tangible Assets
  - 3.1 Shares
  - 3.2 Stock Exchange Trading
  - 3.3 Investment in Real Estate
4. Investment Funds and Certificates
  - 4.1 Mutual Funds
  - 4.2 Fund of Funds and Hedge Funds
  - 4.3 Derivatives
5. Insurance Financial Services
  - 5.1 Fundamentals of the Insurance Industry
  - 5.2 The Life Insurances

#### Literature

#### Compulsory Reading

#### Further Reading

- Bitz, M./Stark, G. (2008): Finanzdienstleistungen. 8. Auflage, Oldenbourg, München/Wien.
- Brealey, R. A./Myers, S. C. (2010): Principles of Corporate Finance. 10. Auflage, McGraw-Hill, London.
- Copeland, T. E./Weston, J. F./Shastri, K. (2008): Finanzierungstheorie und Unternehmenspolitik. 4. Auflage, Pearson, München.
- Hartmann-Wendels, T./Pfungsten, A./Weber, M. (2006): Bankbetriebslehre. 4. Auflage, Springer, Berlin.
- Perridon, L./Steiner, M./Rathgeber, A. W. (2009): Finanzwirtschaft der Unternehmung. 15. Auflage, Vahlen, München.
- Wöhe, G. et al. (2009): Grundzüge der Unternehmensfinanzierung. 10. Auflage, Vahlen, München.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed



## IT project and architecture management

Module Code: DLBCSEITPAM

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (IT Project Management) / N.N. (IT Architecture Management)

### Contributing Courses to Module

- IT Project Management (DLBCSEITPAM01)
- IT Architecture Management (DLBCSEITPAM02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### IT Project Management

- Study Format "Distance Learning": Exam, 90 Minutes

##### IT Architecture Management

- Study Format "Distance Learning": Exam, 90 Minutes

### Weight of Module

see curriculum

**Module Contents****IT Project Management**

- Basic terms and foundations of IT project management
- Large and small planning techniques
- Techniques for prioritization, cost-estimation, and project controlling
- Techniques for stakeholder, communication, and risk management
- Organization and structure in IT project management
- Schools of thought in IT project management

**IT Architecture Management**

- Basic terms and foundations of IT enterprise architectures management
- IT application portfolio management
- Architecture governance
- Modeling of IT enterprise architectures
- Frameworks using TOGAF as an example
- Reference models and sample catalogues

**Learning Outcomes****IT Project Management**

On successful completion, students will be able to

- explain and differentiate between the basic principles and tasks of IT project management.
- explain the important practical techniques and methods necessary for the implementation of IT project management.
- describe the basic procedural models and explain their advantages and disadvantages as well as their possible applications.
- identify possible project risks on the basis of given practical scenarios and select suitable measures from IT project management in order to minimize them in a targeted manner.

**IT Architecture Management**

On successful completion, students will be able to

- describe and explain the basic principles of IT strategy, governance, and architecture management, differentiating between them.
- explain and differentiate the typical activities of IT architecture management, their interrelationships, and their dependencies.
- explain suitable models of IT architecture management, distinguish between them, and explain their intended purpose.
- explain and describe selected IT architectural frameworks as well as reference models and sample catalogues.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field(s) of Computer Science & Software Development.

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology field(s).

# IT Project Management

Course Code: DLBCSEITPAM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In this course, typical problems in the management of Software projects are discussed and the methods and techniques used to address challenges conveyed. In addition, standard procedural models for IT project management are explained and their strengths and weaknesses specifically identified.

## Course Outcomes

On successful completion, students will be able to

- explain and differentiate between the basic principles and tasks of IT project management.
- explain the important practical techniques and methods necessary for the implementation of IT project management.
- describe the basic procedural models and explain their advantages and disadvantages as well as their possible applications.
- identify possible project risks on the basis of given practical scenarios and select suitable measures from IT project management in order to minimize them in a targeted manner.

## Contents

1. Basics Terms and Foundations of IT Project Management
  - 1.1 Definition of a Project and Types of IT Projects
  - 1.2 IT Project Lifecycle
  - 1.3 Multi-Project Management – The Project in the Context of the Organization
2. Planning Techniques
  - 2.1 Large-Scale Planning: Milestones, Sub-tasks, and Work Packages
  - 2.2 Large-Scale Planning: Gantt Charts
  - 2.3 Planning and Organization of Work Packages: Kanban Board
3. Prioritization, Estimation of Costs, Project Controlling
  - 3.1 Prioritization
  - 3.2 Estimation of Costs
  - 3.3 Project Controlling

4. Stakeholder, Communication and Risk Management
  - 4.1 Stakeholder Management
  - 4.2 Communication Management
  - 4.3 Risk Management
  
5. Organization and Structure in IT Project Management
  - 5.1 Overview and Levels of Management from PRINCE2
  - 5.2 Management Processes in PRINCE2
  - 5.3 Pragmatic IT Project Management (PITPM)
  - 5.4 Configuration of an IT Project in PITPM
  - 5.5 Management of a project in PITPM
  
6. Schools of Thought in IT Project Management
  - 6.1 Agile Software Development
  - 6.2 Value-Based Software Engineering

**Literature****Compulsory Reading****Further Reading**

- Berkun, S. (2009): Die Kunst des IT-Projektmanagements. 2. Auflage, O'Reilly, Sebastopol, CA.
- DeMarco, T. (2003): Bärenango. Mit Risikomanagement Projekte zum Erfolg führen. Carl Hanser Verlag, München.
- Geirhos, M. (2011): IT-Projektmanagement. Was wirklich funktioniert – und was nicht. Galileo Computing, Bonn.
- Höhn, R./Höppner S. (2008): Das V-Modell XT. Grundlagen, Methodik und Anwendungen. Springer, Berlin/Heidelberg.
- Malik, M. (2006): Führen, Leisten, Leben. Wirksames Management für eine neue Zeit. Campus, Frankfurt a. M.
- Mangold, P. (2009): IT-Projektmanagement kompakt. 3.Auflage, Spektrum.
- Motzel, E./Pannenbäcker, O. (1998): Projektmanagement-Kanon. Der deutsche Zugang zum Project Management Body of Knowledge. TÜV-Verlag, Köln.
- Patzak, G./Rattay, G.: Projektmanagement. Leitfaden zum Management von Projekten, Projektportfolios und projektorientierten Unternehmen. 5. Auflage, Linde Verlag, Wien.
- Phillips, J. (2010): IT Project Management. On Track from Start to Finish. 3. Auflage, McGraw-Hill, New York, NY.
- Pichler, R. (2007): Scrum. Agiles Projektmanagement erfolgreich einsetzen. dpunkt.verlag, Heidelberg.
- Schwalbe, K. (2010): Information Technology Project Management. 6. Auflage, Course Technology, Independence, KY.
- Tiemeyer, E. (2010): Handbuch IT-Projektmanagement. Vorgehensmodelle, Managementinstrumente, Good Practices. Hanser, München.
- Versteegen, G. (2000): Projektmanagement: mit dem Rational Unified Process. Springer, Berlin/Heidelberg.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# IT Architecture Management

Course Code: DLBCSEITPAM02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In addition to concrete IT projects, such as the development of a new IT system or the introduction of standard software, a strategic management system for organizational-wide IT infrastructure – that is, for all IT hardware and software systems – must be used. Strategic management is the responsibility of the IT enterprise architect, who operates IT architecture management. Their task is to strategically align IT infrastructure with an organization's business and IT strategy. This course covers the typical concepts, methods, procedures, and IT models of architecture management.

## Course Outcomes

On successful completion, students will be able to

- describe and explain the basic principles of IT strategy, governance, and architecture management, differentiating between them.
- explain and differentiate the typical activities of IT architecture management, their interrelationships, and their dependencies.
- explain suitable models of IT architecture management, distinguish between them, and explain their intended purpose.
- explain and describe selected IT architectural frameworks as well as reference models and sample catalogues.

## Contents

1. Basic Terms and Foundation for the Management of IT Enterprise Architectures
  - 1.1 IT Enterprise Architecture
  - 1.2 Goals of Enterprise Architecture Management
  - 1.3 Processes in the Management of IT Enterprise Architectures
2. IT Application Portfolio Management
  - 2.1 IT Application Portfolio Management Overview
  - 2.2 Application Manual
  - 2.3 Portfolio Analysis
  - 2.4 Development Planning



3. Architecture Governance
  - 3.1 Organizational Structure
  - 3.2 Policy Development and Enforcement
  - 3.3 Project Support
4. Modeling of IT Enterprise Architectures
  - 4.1 Models in the Context of IT Architecture Management
  - 4.2 Forms of Documentation for Processes and Applications
  - 4.3 Forms of Documentation for Systems and Technologies
5. Frameworks Using the Example of TOGAF
  - 5.1 Fundamentals and Use of IT Architecture Frameworks
  - 5.2 Overview and Categories of EAM Frameworks
  - 5.3 The Open Group Architecture Framework (TOGAF)
6. Reference Models and Sample Catalogues
  - 6.1 Architecture Reference Models
  - 6.2 EAM Design Sample Catalogue

## Literature

### Compulsory Reading

### Further Reading

- Hanschke, I. (2011): Enterprise Architecture Management. Einfach und effektiv. Hanser, München.
- Keller, W. (2012): IT-Unternehmensarchitektur. Von der Geschäftsstrategie zur optimalen IT-Unterstützung. 2. Auflage, dpunkt.verlag, Heidelberg.
- Keuntje, J. H./Barkow, R. (Hrsg.) (2010): Enterprise Architecture. Management in der Praxis. Wandel, Komplexität und IT-Kosten im Unternehmen beherrschen. Symposion Publishing, Ettlingen.
- Ross, J. W./ Weill, P./Robertson, D. C. (2006): Enterprise Architecture as Strategy. Creating a Foundation for Business Execution. Harvard Business Review Press, Boston, MA.
- Schwarzer, B. (2009): Einführung in das Enterprise Architecture Management. Verstehen – Planen – Umsetzen. Books on Demand, Norderstedt.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Psychology of Human Computer Interaction

Module Code: DLBKPSWPMCI\_E

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

N.N. (Experience Psychology) / N.N. (Human Computer Interaction)

## Contributing Courses to Module

- Experience Psychology (DLBUXEP01\_E)
- Human Computer Interaction (DLBUXHCI01\_E)

## Module Exam Type

### Module Exam

### Split Exam

#### Experience Psychology

- Study Format "Distance Learning": Exam, 90 Minutes

#### Human Computer Interaction

- Study Format "Distance Learning": Exam, 90 Minutes

## Weight of Module

see curriculum

### Module Contents

#### Experience Psychology

- Physiological and Psychological Basics of User Experience
- Future Human-Machine Relationships based on Artificial Intelligence
- Emotional Impact of Design
- User Experience regarding Design Aspects

#### Human Computer Interaction

- Basics of Human Information Processing
- Physiological and Psychological Aspects of Human Perception, Cognition and Behavior
- Technical Framework of Human-Computer Interaction
- Trends in Human-Computer Interaction

### Learning Outcomes

#### Experience Psychology

On successful completion, students will be able to

- outline physiological and psychological basics of user experience.
- understand the emotional impact of design and typography and apply them to specific fields.
- apply principles of Emotional Design.
- understand developments in the human-machine relationship based on future technologies such as artificial intelligence.
- understand and apply aspects of user experience design.

#### Human Computer Interaction

On successful completion, students will be able to

- understand the human basics of perception, information processing, cognition, and motor skills in order to apply them for a user-friendly design of user interfaces.
- understand technical frameworks in the design of user interfaces.
- know and analyze current trends in human-computer interaction.

#### Links to other Modules within the Study Program

This module is similar to other modules in the fields Psychology and Computer Science & Software Development

#### Links to other Study Programs of IUBH

All Bachelor Programs in the Social Sciences and IT & Technology fields

# Experience Psychology

Course Code: DLBUXEP01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim is to teach students the psychological and physiological principles of humans, which are of great importance for the design of digital products and services. First, an overview of the psychological aspects of user experience is given. In addition to emotions, motives and personality traits, the functions of the brain are also discussed. Furthermore, the course teaches the emotional effect that can be created through the use of images, colors and shapes as well as typography. Principles of Emotional Design are taught. In addition, the effect of future technologies such as artificial intelligence in the human-machine relationship will be discussed. A final focus will be placed on design and its importance for user experience.

## Course Outcomes

On successful completion, students will be able to

- outline physiological and psychological basics of user experience.
- understand the emotional impact of design and typography and apply them to specific fields.
- apply principles of Emotional Design.
- understand developments in the human-machine relationship based on future technologies such as artificial intelligence.
- understand and apply aspects of user experience design.

## Contents

1. Basics and Explanations of Terms
  - 1.1 Explanation of terms
  - 1.2 User Experience over Time
  - 1.3 Interaction of Psychology and Design
2. How "Experience" Works in the Brain
  - 2.1 Anatomy of the Human Brain
  - 2.2 Limbic System
  - 2.3 Main Components of a Nerve Cell
  - 2.4 Brain Research and Marketing Myths

3. Personal Drivers: Emotions, Motives and Personality Traits
  - 3.1 Reward and Avoidance System
  - 3.2 Motives and Goals
  - 3.3 Personality Traits of the Human Being
  - 3.4 Relevance, Credibility and Differentiation
4. Emotional Design: Retrospect and Future
  - 4.1 Different Levels of Emotional Design
  - 4.2 Design Principles of Emotional Design
  - 4.3 Emotional Design and Technology
  - 4.4 Emotion and Artificial Intelligence
  - 4.5 The Future of the Human-Machine Relationship
5. How Design works
  - 5.1 Effect of Images
  - 5.2 Effect of Colors
  - 5.3 Effect of Shapes
6. How typography works
  - 6.1 Basics of Typography
  - 6.2 Effect of Typography
  - 6.3 Target use of Typography
7. Design of User Experience
  - 7.1 From User-Friendliness to Information Experience
  - 7.2 Design of the Flow Experience
  - 7.3 The Role of Aesthetics
  - 7.4 Emotional Inspiration

**Literature****Compulsory Reading****Further Reading**

- Evans, D. C. (2017): Bottlenecks: Aligning UX Design with User Psychology. Apress, Springer Science + Business, New York.
- Kahneman, D. (2011): Thinking, fast and slow. Penguin Books, London.
- Norman, D. (2013): The design of everyday things. Revised and expanded edition. Basic Books, New York.
- Turner, P. (2017): A Psychology of User Experience. Human Computer Interaction Series. Springer International Publishing, Cham/Switzerland.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed



# Human Computer Interaction

Course Code: DLBUXHCI01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The objective of this course is to teach students fundamental aspects of interaction between humans and computers. For a user-friendly design of interfaces on computers, machines and devices, a precise knowledge of human abilities and skills is necessary. The main focus of the course is on teaching the basics of human information processing. Special attention is paid to the physiological and psychological aspects of perception, cognition and motor skills. In addition to basics from a human perspective, the technical conditions for the machine perspective will be introduced. Finally, trends in human-computer interaction will be discussed.

## Course Outcomes

On successful completion, students will be able to

- understand the human basics of perception, information processing, cognition, and motor skills in order to apply them for a user-friendly design of user interfaces.
- understand technical frameworks in the design of user interfaces.
- know and analyze current trends in human-computer interaction.

## Contents

1. Fundamentals of Human-Computer Interaction
  - 1.1 Definitions
  - 1.2 Challenges in Human Computer Interaction
  - 1.3 Basic Models of Human Information Processing
2. Perception
  - 2.1 Sight and Visual Perception
  - 2.2 „Gestaltpsychology“ laws
  - 2.3 Attentive and Preattentive Perception
  - 2.4 Auditory Sense and Auditory Perception
  - 2.5 Sense of Touch and Proprioception
  - 2.6 Smell and Taste Perception

3. Cognition, Motor Skills
  - 3.1 Memory Types and Cognitive Processes
  - 3.2 Stress due to Multiple Tasks
  - 3.3 Measuring Cognitive Load
  - 3.4 Decision Making and Speed
  - 3.5 Motor Skills
4. Mental Models and Errors
  - 4.1 Mental Models
  - 4.2 User Error
  - 4.3 Basic Types of Errors
  - 4.4 Murphy's Law
5. Technical Framework
  - 5.1 Visual Representation and Spatial Resolution
  - 5.2 Time Resolution
  - 5.3 Representation of Color and Brightness
  - 5.4 Acoustic Representation
  - 5.5 Moore's Law
6. Aspects of the Interaction with Socio-Technical systems
  - 6.1 Overview of Interaction Styles
  - 6.2 Acceptance
  - 6.3 Trust
  - 6.4 Security and Data Protection
7. Trends in Human-Computer Interaction
  - 7.1 Intelligent Systems
  - 7.2 Ubiquitous Computing
  - 7.3 Augmented Reality
  - 7.4 Multimodal Interaction
  - 7.5 Haptics

**Literature****Compulsory Reading****Further Reading**

- Sharp, H./Preece, J./Rogers, Y. (2019): Interaction Design: Beyond Human-Computer Interaction. 5. Auflage, John Wiley & Sons, Indianapolis.
- Shneiderman, B./Plaisant, C./Cohen, M./Jacobs, S./Elmqvist, N./Diakopoulos, N. (2017): Designing the User Interface: Strategies for Effective Human-Computer Interaction. 6. Auflage, Pearson, Harlow.
- Stanton, N./Salmon, P.M./Rafferty, L.A./Walker, F.H./Baber, Ch./Jenkins, D.P. (2017): Human Factors Methods: A Practical Guide for Engineering and Design. 2. Auflage, CRC Press Taylor & Francis Group, Boca Raton

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Autonomous Driving

Module Code: DLBDSEAD

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	150 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

N.N. (Self-Driving Vehicles) / N.N. (Seminar: Current Topics and Trends in Self-Driving Technology)

### Contributing Courses to Module

- Self-Driving Vehicles (DLBDSEAD01)
- Seminar: Current Topics and Trends in Self-Driving Technology (DLBDSEAD02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Self-Driving Vehicles

- Study Format "Distance Learning": Exam, 90 Minutes (50)

##### Seminar: Current Topics and Trends in Self-Driving Technology

- Study Format "Distance Learning": Written Assessment: Research Essay (50)

### Weight of Module

see curriculum

**Module Contents****Self-Driving Vehicles**

- Safety standards
- Sensor fusion
- Computer vision
- Localization & motion
- Motion planning

**Seminar: Current Topics and Trends in Self-Driving Technology**

The seminar covers current topics of autonomous vehicles. The choice of topics can include (but are not limited to) recent technical advances as well as philosophical issues or implications for society, law, or relevant industries.

**Learning Outcomes****Self-Driving Vehicles**

On successful completion, students will be able to

- cite relevant safety standards.
- grasp the concepts of sensors and sensor fusion.
- apply computer vision techniques to detect features.
- evaluate images in terms of semantic segmentation.
- understand motion models and localization approaches.
- utilize motion planning techniques.

**Seminar: Current Topics and Trends in Self-Driving Technology**

On successful completion, students will be able to

- transfer theoretical knowledge and methods to new domains.
- understand recent developments in self-driving vehicles.
- create new insights based on detailed studies of current research and technology.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Engineering

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Self-Driving Vehicles

Course Code: DLBDSEAD01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course focuses on the foundations of autonomous vehicles and starts with a detailed introduction to relevant safety standards in terms of functional and IT security. This course continues with a presentation of the concept of sensor fusion and discusses relevant aspects of computer vision techniques such as feature detection, calibration, and semantic segmentation. A large part of the course concerns localization and motion planning. Relevant motion models are introduced and localization techniques such as odometry, triangulation, and satellite-based systems are discussed in detail, along with path planning, motion prediction, and trajectory generation.

## Course Outcomes

On successful completion, students will be able to

- cite relevant safety standards.
- grasp the concepts of sensors and sensor fusion.
- apply computer vision techniques to detect features.
- evaluate images in terms of semantic segmentation.
- understand motion models and localization approaches.
- utilize motion planning techniques.

## Contents

1. Sensors
  - 1.1 Physical principles of sensors
  - 1.2 Types of sensors
  - 1.3 Sensor calibration
  - 1.4 Application scenarios
2. Sensor Fusion
  - 2.1 Elaborating data from sensors
  - 2.2 Kalman filter
  - 2.3 Object tracking

3. Computer Vision
  - 3.1 Pixels and filters
  - 3.2 Feature detection
  - 3.3 Distortions and calibration
  - 3.4 Semantic segmentation
4. Localization & Motion
  - 4.1 Motion models
  - 4.2 Odometry
  - 4.3 Triangulation
  - 4.4 Satellite-based localization
5. Motion planning
  - 5.1 Path planning
  - 5.2 Motion prediction
  - 5.3 Trajectory generation
6. Safety Standards
  - 6.1 Functional Safety
  - 6.2 IT Security Standards
  - 6.3 Safety development approaches



**Literature****Compulsory Reading****Further Reading**

- Ben-Ari, M./Mondada, F. (2018): Elements of robotics. Springer, Cham.
- European Union. (2001): Directive 2001/95/EG. (URL: <https://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX%3A32001L0095> [Retrieved: 28.02.2020])
- Fisher, R. B., et al. (2016): Dictionary of computer vision and image processing. John Wiley & Sons, Chichester.
- International Electrotechnical Commission. (2015): IEC 61508. (URL: <https://www.iec.ch/functionalsafety/> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2009): ISO 15408. (URL: <https://www.iso.org/standard/50341.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 25119. (URL: <https://www.iso.org/standard/69026.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 26262. (URL: <https://www.iso.org/standard/68383.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (n.d.): ISO 21434. (URL: <https://www.iso.org/standard/70918.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO/IEC 27001. (URL: <https://www.iso.org/isoiec-27001-information-security.html> [Retrieved: 28.02.2020])
- Rausand, M. (2014): Reliability of safety-critical systems: Theory and applications. Wiley, Hoboken, NJ.
- Smith, D. J./Simpson, K. (2016): The safety critical systems handbook. 4th ed., Elsevier, Oxford.
- Smith, D. J. (2017): Reliability, maintainability and risk. 9th ed., Elsevier, Oxford.
- Society of Automobile Engineers International. (2012): SAE J3061. (URL: <https://www.sae.org/standards/content/j3061/> [Retrieved: 28.02.2020])
- Szelski, R. (2011): Computer vision: Algorithms and applications. 2nd ed., Springer VS, Wiesbaden.
- Wang, P. K.-C. (2015): Visibility-based optimal path and motion planning (vol. 568). Springer, Cham.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Seminar: Current Topics and Trends in Self-Driving Technology

Course Code: DLBDSEAD02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course focuses on recent developments in the field of self-driving vehicles. Following the course Self-Driving Vehicles (DLBDSEAD01), in this course students will focus on a particular topic in the context of autonomous driving, applying the knowledge they have obtained in the first course. Finally, a research essay will be written.

## Course Outcomes

On successful completion, students will be able to

- transfer theoretical knowledge and methods to new domains.
- understand recent developments in self-driving vehicles.
- create new insights based on detailed studies of current research and technology.

## Contents

- The seminar covers current topics of autonomous vehicles. The choice of topics can include (but are not limited to) recent technical advances as well as philosophical issues or implications for society, law, or relevant industries.

**Literature****Compulsory Reading****Further Reading**

- Ben-Ari, M./Mondada, F. (2018): Elements of robotics. Springer, Cham.
- European Union. (2001): Directive 2001/95/EG. (URL: <https://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX%3A32001L0095> [Retrieved: 28.02.2020])
- Fisher, R. B., et al. (2016): Dictionary of computer vision and image processing. John Wiley & Sons, Chichester.
- International Electrotechnical Commission. (2015): IEC 61508. (URL: <https://www.iec.ch/functionalsafety/> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2009): ISO 15408. (URL: <https://www.iso.org/standard/50341.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 25119. (URL: <https://www.iso.org/standard/69026.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO 26262. (URL: <https://www.iso.org/standard/68383.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (n.d.): ISO 21434. (URL: <https://www.iso.org/standard/70918.html> [Retrieved: 28.02.2020])
- International Organization for Standardization. (2018): ISO/IEC 27001. (URL: <https://www.iso.org/isoiec-27001-information-security.html> [Retrieved: 28.02.2020])
- Marchthaler, R./Dingler, S. (2017): Kalman-Filter. Springer, Wiesbaden.
- Rausand, M. (2014): Reliability of safety-critical systems: Theory and applications. Wiley, Hoboken, NJ.
- Smith, D. J./Simpson, K. (2016): The safety critical systems handbook. 4th ed., Elsevier, Oxford.
- Smith, D. J. (2017): Reliability, maintainability and risk. 9th ed., Elsevier, Oxford.
- Society of Automobile Engineers International. (2012): SAE J3061. (URL: <https://www.sae.org/standards/content/j3061/> [Retrieved: 28.02.2020])
- Szelski, R. (2011): Computer vision: Algorithms and applications. 2nd ed., Springer VS, Wiesbaden.
- Wang, P. K.-C. (2015): Visibility-based optimal path and motion planning (vol. 568). Springer, Cham.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Seminar
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Research Essay

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAD02

## Automation and Robotics

Module Code: DLBDSEAR

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> <ul style="list-style-type: none"> <li>▪ none</li> <li>▪ DLBDSEAR01</li> </ul>	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

Prof. Dr. Mario Boßlau (Production Engineering) / N.N. (Automation and Robotics)

### Contributing Courses to Module

- Production Engineering (DLBDSEAR01)
- Automation and Robotics (DLBDSEAR02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Production Engineering

- Study Format "Distance Learning": Exam, 90 Minutes (50)

##### Automation and Robotics

- Study Format "Distance Learning": Module Exam (50)

### Weight of Module

see curriculum

### **Module Contents**

#### **Production Engineering**

- Introduction to Manufacturing Technology
- Main Production Groups According to DIN 8580
- Additive Manufacturing Processes
- Rapid Prototyping
- Rapid Tooling
- Direct/Rapid Manufacturing
- Cyber-Physical Production Plants

#### **Automation and Robotics**

- Basics of Automation
- Fundamentals of Measurement Technology
- Sensors
- Basics of Control Engineering
- Basics of Control Technology
- Introduction to Robotics
- Kinematics of a Robot



**Learning Outcomes****Production Engineering**

On successful completion, students will be able to

- understand the basic concepts and interrelationships of production engineering.
- understand current changes in manufacturing technology due to technologies such as additive manufacturing and megatrends such as cyber physical systems.
- assign different manufacturing processes to the main manufacturing groups according to DIN 8580.
- understand the basic principle of additive manufacturing processes.
- distinguish between different additive manufacturing processes.
- understand the terms Rapid Prototyping, Rapid Tooling, and Direct Manufacturing and name individual processes and application examples.
- understand the elements and properties of cyber-physical production plants.

**Automation and Robotics**

On successful completion, students will be able to

- understand the basic aspects of automation.
- understand the different sizes and units in measurement technology.
- differentiate between different measurement methods.
- understand the basic structure of measuring equipment.
- select a suitable sensor based on various criteria.
- understand the elements of control systems.
- describe the behavior of control systems in the time and frequency domain.
- understand the basic principles of control technology.
- convert between different number systems and apply Boolean algebra.
- understand the structure of switching networks, plants, and storages.
- understand important elements of control systems such as signal generators and power amplifiers.
- design simple programmable logic controllers.
- understand the basic structure of industrial robots.
- calculate different movements and positions of jointed-arm robots.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Engineering

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields

# Production Engineering

Course Code: DLBDSEAR01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim of the course is to provide students with an overview of the processes that have influenced and still influence production processes through technological developments under the generic term Industry 4.0, based on traditional, standardized manufacturing techniques. These include, in particular, technological advances in additive manufacturing processes that enable applications such as rapid prototyping, rapid tooling, and direct manufacturing. Finally, the course deals with the consequences of the digitalization and networking of production facilities and their elements in the sense of a cyber-physical system.

## Course Outcomes

On successful completion, students will be able to

- understand the basic concepts and interrelationships of production engineering.
- understand current changes in manufacturing technology due to technologies such as additive manufacturing and megatrends such as cyber physical systems.
- assign different manufacturing processes to the main manufacturing groups according to DIN 8580.
- understand the basic principle of additive manufacturing processes.
- distinguish between different additive manufacturing processes.
- understand the terms Rapid Prototyping, Rapid Tooling, and Direct Manufacturing and name individual processes and application examples.
- understand the elements and properties of cyber-physical production plants.

## Contents

1. Introduction to Manufacturing Technology
  - 1.1 Basic Terms and Contexts in Manufacturing Theory
  - 1.2 Historical Development of Production
  - 1.3 The Discussion About the Long Tail

2. Main Production Groups According to DIN 8580
  - 2.1 Archetypes
  - 2.2 Reshaping
  - 2.3 Cutting (Cutting, Machining, Ablation)
  - 2.4 Joining
  - 2.5 Coating
  - 2.6 Substance Property Changes
3. Additive Manufacturing Processes
  - 3.1 Basic Principles and Legal Aspects
  - 3.2 Stereolithography (STL)
  - 3.3 Selective Laser Sintering and Selective Beam Melting With Laser or Electron Beam
  - 3.4 Fused Deposition Modeling (FDM)
  - 3.5 Multi-Jet Modeling (MJM) and Poly-Jet Process (PJM)
  - 3.6 3D Printing Process (3DP)
  - 3.7 Laminating Processes
  - 3.8 Mask Sintering
4. Rapid Prototyping
  - 4.1 Definition
  - 4.2 Strategic and Operational Aspects
  - 4.3 Application Areas and Examples
5. Rapid Tooling
  - 5.1 Definition, Strategic, and Operational Aspects
  - 5.2 Indirect and Direct Procedures
6. Direct/Rapid Manufacturing
  - 6.1 Potentials and Requirements for Procedures
  - 6.2 Implementation, Application Areas, and Examples
7. Cyber-Physical Production Plants
  - 7.1 Derivation of the Terms Industry 4.0 and Cyber-Physical Systems
  - 7.2 Megatrend Cyber Physical Systems (CPS)
  - 7.3 Definition Cyber-Physical Production Plant
  - 7.4 Effects on Planning and Operation of Production Facilities
  - 7.5 Dynamic Reconfiguration and Migration of Production Facilities

**Literature****Compulsory Reading****Further Reading**

- Anderson, C. (2012): Makers. The new industrial revolution. Crown Business, New York.
- Bauernhansl, Thomas/Hompel, M. ten/Vogel-Heuser, B. (Hrsg.) (2014): Industrie 4.0 in Produktion, Automatisierung und Logistik. Anwendung – Technologien – Migration. Springer, Wiesbaden.
- Gebhardt, A. (2012): Understanding Additive Manufacturing. Rapid Prototyping – Rapid Tooling – Rapid Manufacturing. Hanser, München/Cincinnati.
- Lachmayer, R./Lippert, R. B./Fahlbusch, T. (Hrsg.) (2016): 3D-Druck beleuchtet. Additive Manufacturing auf dem Weg in die Anwendung. Springer, Berlin/Heidelberg.
- Wittenstein, M. et al. (Hrsg.) (2015): Intelligente Vernetzung in der Fabrik. Industrie 4.0. Umsetzungsbeispiele für die Praxis. Fraunhofer Verlag, Stuttgart.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Automation and Robotics

Course Code: DLBDSEAR02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	DLBDSEAR01

### Course Description

The aim of the course is to provide students with an insight into measurement, control, and regulation technology and convey the basics of robotics. Students will be taught which methods can be used to determine certain measured variables and how measurement errors are dealt with. Based on these fundamentals, various sensors will be presented and students will be able to select suitable sensors based on predefined criteria. The course also introduces students to the basics of control engineering. The different ways of describing the structure and behaviour of control systems are illustrated to the students. The basics of control engineering are also taught. The students receive a short introduction to binary number systems and Boolean algebra, and deal with various basal circuit and control elements. Finally, students will gain an insight into robotics with a focus on industrial robots. In this context, the students learn the description and calculation of positions and movements of individual limbs of a robot arm.

### Course Outcomes

On successful completion, students will be able to

- understand the basic aspects of automation.
- understand the different sizes and units in measurement technology.
- differentiate between different measurement methods.
- understand the basic structure of measuring equipment.
- select a suitable sensor based on various criteria.
- understand the elements of control systems.
- describe the behavior of control systems in the time and frequency domain.
- understand the basic principles of control technology.
- convert between different number systems and apply Boolean algebra.
- understand the structure of switching networks, plants, and storages.
- understand important elements of control systems such as signal generators and power amplifiers.
- design simple programmable logic controllers.
- understand the basic structure of industrial robots.
- calculate different movements and positions of jointed-arm robots.

**Contents**

1. Basics of Automation
  - 1.1 Basic Terms
  - 1.2 Economic Aspects
  - 1.3 Automation Pyramid
  - 1.4 Measuring, Control, and Regulation Systems
2. Fundamentals of Measurement Technology
  - 2.1 Measurands and Units
  - 2.2 Forms of Measurement Signals
  - 2.3 Measurement Techniques
  - 2.4 Measuring Equipment
  - 2.5 Evaluation of Measurements and Measurement Errors
3. Sensors
  - 3.1 Function and Elements of Sensors
  - 3.2 Criteria for the Selection of Sensors
  - 3.3 Proximity Switches
  - 3.4 Photoelectric Sensors
  - 3.5 Ultrasonic Sensors
  - 3.6 Rotary Encoder
  - 3.7 Force, Torque, and Pressure Gauges
  - 3.8 Temperature Sensors
  - 3.9 Image Processing Sensors
4. Basics of Control Engineering
  - 4.1 Elements of Control Systems
  - 4.2 Structure Description
  - 4.3 Static Behavioral Description
  - 4.4 Behavioral Description in the Time Domain
  - 4.5 Behavioral Description in the Frequency Domain
  - 4.6 Practical examples

5. Basics of Control Technology
  - 5.1 Basic Principle and Elements of Control Systems
  - 5.2 Numerical Representations
  - 5.3 Boolean Algebra
  - 5.4 Switching Networks, Plants, and Storage Facilities
  - 5.5 Signal Generators and Power Amplifiers
  - 5.6 Programmable Logic Controllers
  - 5.7 Connection-Programmed Controls
  
6. Introduction to Robotics
  - 6.1 Terms and Classification
  - 6.2 Basic Elements
  - 6.3 Classification of Robots
  
7. Kinematics of a Robot
  - 7.1 Coordinate Systems and Reference Points
  - 7.2 Rotations
  - 7.3 Forward and Reverse Transformations
  - 7.4 Denavit-Hartenberg Transformation

### Literature

#### Compulsory Reading

#### Further Reading

- Heinrich, B./Linke, P./Glöckler, M. (2015): Grundlagen Automatisierung. Springer, Wiesbaden.
- Hesse, S./Malisa, V. (Hrsg.) (2016): Taschenbuch Robotik – Montage – Handhabung. 2. Auflage, Carl Hanser Verlag, München.
- Jazar, R. N. (2010): Theory of Applied Robotics. 2. Auflage, Springer US, Boston (MA).
- Karaali, C. (2013): Grundlagen der Steuerungstechnik. Springer, Wiesbaden.
- Parthier, R. (2011): Messtechnik. Grundlagen und Anwendungen der elektrischen Messtechnik für alle technischen Fachrichtungen und Wirtschaftsingenieure. 6. Auflage, Vieweg & Teubner, Wiesbaden.
- Tietze, U./Schenk, C./Gamm, E. (2016): Halbleiter-Schaltungstechnik. 15. Auflage, Springer, Berlin.
- Zacher, S./Reuter, M. (2014): Regelungstechnik für Ingenieure. Springer, Wiesbaden.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAR02

# Data Engineer

Module Code: DLBDSEDE

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

## Module Coordinator

N.N. (Data Engineering ) / N.N. (Project: Data Engineering)

## Contributing Courses to Module

- Data Engineering (DLBDSEDE01)
- Project: Data Engineering (DLBDSEDE02)

## Module Exam Type

### Module Exam

### Split Exam

#### Data Engineering

- Study Format "Distance Learning": Exam, 90 Minutes

#### Project: Data Engineering

- Study Format "Distance Learning": Portfolio

## Weight of Module

see curriculum

**Module Contents****Data Engineering**

- understand important foundational concepts in data engineering.
- recognize established and commonly-employed NoSQL datastores and their salient characteristics.
- comprehend common architectural patterns for data processing at scale.
- explain the concept of containerization as a virtualization approach.
- analyze operational challenges in the set-up and maintenance of data pipelines.
- demonstrate familiarity with concepts relating to data security and protection.

**Project: Data Engineering**

- formulate and implement a real-world data engineering use case.
- select appropriate resources for the task at hand.
- transfer acquired specialized knowledge in data engineering to a real-world use case.
- derive relevant design choices from the given project setting.
- analyze the suitability of different solution options with respect to the project task.
- make apposite choices with respect to implementation alternatives.

**Learning Outcomes****Data Engineering**

On successful completion, students will be able to

- understand important foundational concepts in data engineering.
- recognize established and commonly-employed NoSQL datastores and their salient characteristics.
- comprehend common architectural patterns for data processing at scale.
- explain the concept of containerization as a virtualization approach.
- analyze operational challenges in the set-up and maintenance of data pipelines.
- demonstrate familiarity with concepts relating to data security and protection.

**Project: Data Engineering**

On successful completion, students will be able to

- formulate and implement a real-world data engineering use case.
- select appropriate resources for the task at hand.
- transfer acquired specialized knowledge in data engineering to a real-world use case.
- derive relevant design choices from the given project setting.
- analyze the suitability of different solution options with respect to the project task.
- make apposite choices with respect to implementation alternatives.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field(s) of Data Science & Artificial Intelligence.

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology field(s).

# Data Engineering

Course Code: DLBDESEDE01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course explores concepts of data engineering. Data engineering is concerned with the infrastructure aspects of data science such as data storage and provision, as well as the provisioning of suitable operational environments. After laying out foundational notions and concepts of the discipline, this course addresses important developments in storage technology; aspects of systems architecture for processing data at scale; containerization as a modern take on virtualization; and the logic of data pipelines and associated operational aspects. Important issues pertaining to data security and protection are also given appropriate attention.

## Course Outcomes

On successful completion, students will be able to

- understand important foundational concepts in data engineering.
- recognize established and commonly-employed NoSQL datastores and their salient characteristics.
- comprehend common architectural patterns for data processing at scale.
- explain the concept of containerization as a virtualization approach.
- analyze operational challenges in the set-up and maintenance of data pipelines.
- demonstrate familiarity with concepts relating to data security and protection.

## Contents

1. Foundations of Data Engineering
  - 1.1 Reliability
  - 1.2 Scalability
  - 1.3 Maintainability
2. NoSQL In Depth
  - 2.1 Fundamentals of NoSQL
  - 2.2 Established NoSQL solutions
3. Architectures for Data Processing at Scale
  - 3.1 Batch processing architectures
  - 3.2 Architectures for stream and complex event processing
  - 3.3 Lambda architecture

4. Containerization In Depth
  - 4.1 Docker containers
  - 4.2 Container management
5. Governance & Security
  - 5.1 Data protection
  - 5.2 Data security
  - 5.3 Data governance
6. Operational Aspects
  - 6.1 Defining principles of DataOps
  - 6.2 Building and maintaining data pipelines
  - 6.3 Metrics and monitoring

#### Literature

#### Compulsory Reading

#### Further Reading

- Kleppmann, M. (2017). *Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems*. Sebastopol, CA: O'Reilly.
- Marz, N., & Warren, J. (2015). *Big data: Principles and best practices of scalable realtime data systems*. Shelter Island, NY: Manning Publications.
- Matthias, K., & Kane, S. P. (2018). *Docker: Up & running (2nd ed.)*. Sebastopol, CA: O'Reilly.
- Miell, I., & Sayers, A. (2019). *Docker in practice (2nd ed.)*. Shelter Island, NY: Manning Publications.
- Muhammad, S., & Akhtar, F. (2018). *Big data architect's handbook*. Birmingham: Packt Publishing.
- Schenker, G. N. (2018). *Learn Docker - Fundamentals of Docker 18.x: Get up and running with the concepts of Docker*. Birmingham: Packt Publishing.
- Wilson, J., Redmond, E., & Perkins, L. (2018). *Seven databases in seven weeks (2nd ed.)*. Raleigh, NC: Pragmatic Bookshelf.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Data Engineering

Course Code: DLBDESE02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The focus of this course is the implementation of a real-world data engineering use case in the form of a student portfolio. To this end, students choose a project subject from the various sub-domains of data engineering. Examples include setting up a Docker container environment or dockerized service; implementing a data pipeline according to DataOps principles; and setting up an NoSQL data store. The goal is for students to demonstrate they can transfer theoretical knowledge to an implementation scenario that closely mimics practical work in a professional data engineering setting.

### Course Outcomes

On successful completion, students will be able to

- formulate and implement a real-world data engineering use case.
- select appropriate resources for the task at hand.
- transfer acquired specialized knowledge in data engineering to a real-world use case.
- derive relevant design choices from the given project setting.
- analyze the suitability of different solution options with respect to the project task.
- make apposite choices with respect to implementation alternatives.

### Contents

- This course covers the practical implementation of approaches and techniques covered in the preceding methodological course in a project-oriented setting. Each participant must produce a portfolio detailing and documenting the work. Portfolio themes are chosen from a list, or suggested by the students in accord with the tutor.



**Literature****Compulsory Reading****Further Reading**

- Kleppmann, M. (2017). *Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems*. Sebastopol, CA: O'Reilly.
- Marz, N., & Warren, J. (2015). *Big data: Principles and best practices of scalable realtime data systems*. Shelter Island, NY: Manning Publications.
- Matthias, K., & Kane, S. P. (2018). *Docker: Up & running (2nd ed.)*. Sebastopol, CA: O'Reilly.
- Miell, I., & Sayers, A. (2019). *Docker in practice (2nd ed.)*. Shelter Island, NY: Manning Publications.
- Muhammad, S., & Akhtar, F. (2018). *Big data architect's handbook*. Birmingham: Packt Publishing.
- Schenker, G. N. (2018). *Learn Docker - Fundamentals of Docker 18.x: Get up and running with the concepts of Docker*. Birmingham: Packt Publishing.
- Wilson, J., Redmond, E., & Perkins, L. (2018). *Seven databases in seven weeks (2nd ed.)*. Raleigh, NC: Pragmatic Bookshelf.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Digital Signal Processing and Sensor Technology

Module Code: DLBAIEDSPST

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

N.N. (Digital Signal Processing) / Prof. Dr. Leonardo Riccardi (Sensor Technology)

## Contributing Courses to Module

- Digital Signal Processing (DLBROEICR01\_E)
- Sensor Technology (DLBROST01\_E)

## Module Exam Type

### Module Exam

### Split Exam

Digital Signal Processing

- Study Format "Distance Learning": Exam, 90 Minutes (50)

Sensor Technology

- Study Format "Distance Learning": Exam, 90 Minutes

## Weight of Module

see curriculum

**Module Contents****Digital Signal Processing**

- Signal sampling and quantization
- Digital signals and systems
- Discrete Fourier Transform
- z-Transform
- Digital signal processing and filters

**Sensor Technology**

- Sensors and transducers
- Resistive, capacitive, inductive, optical and acoustic sensor effects
- Transduction platforms and sensor systems
- Applications
- Advanced sensors

**Learning Outcomes****Digital Signal Processing**

On successful completion, students will be able to

- analyze discrete time systems.
- apply analysis tools such as the Discrete Fourier Transform.
- apply the z-Transform.
- analyze properties of discrete systems.
- design finite and infinite impulse response filters.
- implement filters in hardware and software.

**Sensor Technology**

On successful completion, students will be able to

- understand the main sensor characteristics.
- read and understand a typical sensor data sheet.
- understand sensor effects.
- understand and characterize sensor platforms.
- select the appropriate sensor technology for a given application.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Engineering

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

# Digital Signal Processing

Course Code: DLBROEICR01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Digital signal processing enables digital audio and video extraction, as well as extraction of important features from any other kind of signal, for instance medical imagery or diagnostic tools. This course provides the students with expertise on the theory and practice of digital signal processing. In the first part, theoretical concepts are introduced, presenting the main tools for analysis of digital, i.e., sampled or discrete-time systems. The core of digital signal processing resides in the design of a digital filter. The second part of the course focuses on different filter-design approaches, i.e. a discussion on finite impulse response and infinite impulse response filters. The last part gives important insights into the hardware and software implementation of digital signal processing, bridging theory with applied practice.

## Course Outcomes

On successful completion, students will be able to

- analyze discrete time systems.
- apply analysis tools such as the Discrete Fourier Transform.
- apply the z-Transform.
- analyze properties of discrete systems.
- design finite and infinite impulse response filters.
- implement filters in hardware and software.

## Contents

1. Introduction
  - 1.1 Basic Concepts
  - 1.2 Applications
2. Signal Sampling and Quantization
  - 2.1 Sampling
  - 2.2 Signal reconstruction
  - 2.3 Analog-to-digital Conversion
  - 2.4 Digital-to-Analog Conversion
  - 2.5 Quantization

3. Digital Signals and Systems
  - 3.1 Digital Signals
  - 3.2 Difference Equations and Impulse Responses
  - 3.3 BIBO-Stability
  - 3.4 Digital Convolution
4. Discrete Fourier Transform
  - 4.1 Discrete Fourier Transform
  - 4.2 Amplitude and Power Spectrum
  - 4.3 Spectral Estimation
5. The z-Transform
  - 5.1 Definition
  - 5.2 Properties
  - 5.3 Inverse z-Transform
  - 5.4 Solution of Difference Equations
6. Digital Signal Processing Systems and Filters
  - 6.1 Difference Equation and Transfer Function
  - 6.2 Poles, Zeros and Stability
  - 6.3 Digital Filter Frequency Response
  - 6.4 Basic Filtering
  - 6.5 Realization of Digital Filters
  - 6.6 Applications
7. Finite Impulse Response Filter Design
  - 7.1 Basics
  - 7.2 Fourier Transform Design
  - 7.3 Window Method
  - 7.4 Frequency Sampling Design Method
  - 7.5 Optimal Design Method
  - 7.6 Applications

8. Infinite Impulse Response Filter Design
  - 8.1 Basics
  - 8.2 Bilinear Transformation Design Method
  - 8.3 Butterworth and Chebyshev Filter Designs
  - 8.4 Higher-Order Infinite Impulse Response Filter Design
  - 8.5 Pole-Zero Placement for Simple Filters
  - 8.6 Applications
9. Hardware and Software for Digital Signal Processing
  - 9.1 Digital Signal Processor Architecture
  - 9.2 Digital Signal Processor Hardware Units
  - 9.3 Fixed-Point and Floating-Point Formats
  - 9.4 Implementation of FIR and IIR Filters in Fixed-Point
  - 9.5 DSP Programming Examples

**Literature****Compulsory Reading****Further Reading**

- Manolakis, D. G./Ingle, V. K. (2011): Applied digital signal processing: theory and practice. Cambridge University Press, Cambridge.
- Tan, L./Jiang, J. (2013): Digital signal processing: fundamentals and applications. 2nd ed., Academic Press, Cambridge, MS.
- Vetterli, M./Kovačević, J./Goyal, V. K. (2014): Foundations of signal processing. 2nd ed., Cambridge University Press, Cambridge.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed



# Sensor Technology

Course Code: DLBROST01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Sensors are at the base of any modern engineering system, for example, control systems in robotics. This course provides the basic knowledge to understand sensors and their characteristics. A specific sensor is chosen for an application mainly based on its characteristics and on its physical effect. After an introduction on sensors and types of sensors, this course introduces the main characteristics such as accuracy, precision, resolution, sensitivity, linearity, static and dynamic properties. The second part of the course details the main sensor effects and shows how sensor systems can be built based on such effects and used in engineering applications. The last part of the course shows current trends and advanced applications of sensor technology.

## Course Outcomes

On successful completion, students will be able to

- understand the main sensor characteristics.
- read and understand a typical sensor data sheet.
- understand sensor effects.
- understand and characterize sensor platforms.
- select the appropriate sensor technology for a given application.

## Contents

1. Introduction to Measurement Uncertainty
  - 1.1 Measurement Uncertainty
  - 1.2 Confidence Intervals
  - 1.3 Expression of Uncertainty
2. Sensors
  - 2.1 Sensors and Transducers
  - 2.2 Selection of Sensors
  - 2.3 Sensor Characteristics
  - 2.4 Measurement Systems and Components

3. Resistive Sensors
  - 3.1 Resistivity and Resistance
  - 3.2 Potentiometric Sensors
  - 3.3 Strain Gauges
  - 3.4 Piezoresistive Sensors
  - 3.5 Magnetoresistive Sensors
  - 3.6 Thermoresistive Sensors
  - 3.7 Optoresistive Sensors
4. Capacitive Sensors
  - 4.1 Capacitance and Permittivity
  - 4.2 Configurations
  - 4.3 Applications
5. Inductive and Magnetic Sensors
  - 5.1 Magnetic and Electromagnetic Quantities
  - 5.2 Magnetic Field Sensors
  - 5.3 Magnetic Displacement and Force Sensors
  - 5.4 Applications
6. Optical Sensors
  - 6.1 Electro-Optical Components
  - 6.2 Optical Displacement Sensors
  - 6.3 Applications
7. Piezoelectric Sensors
  - 7.1 Piezoelectricity
  - 7.2 Force Pressure and Acceleration Sensors
  - 7.3 Applications
8. Acoustic Sensors
  - 8.1 Acoustic Medium
  - 8.2 Measurement Methods
  - 8.3 Applications

9. Advanced Sensor Technology
  - 9.1 Organic Sensors
  - 9.2 Sensors for Health and Environment
  - 9.3 Wearable Sensors
  - 9.4 Wireless Sensors in Industrial Environments

**Literature****Compulsory Reading****Further Reading**

- Kalantar-Zadeh, K. (2013): Sensors: An Introductory Course. Springer US, New York, NY.
- Lin, Y. L. et al (eds.) (2015): Smart Sensors and Systems. Springer International Publishing, Cham.
- Mukhopadhyay, S. C. (ed.) (2016): Next Generation Sensors and Systems. In: Smart Sensors, Measurement and Instrumentation, Vol. 16. Springer International Publishing, Cham.
- Regtien, P./Dertien, E. (2018): Sensors for Mechatronics. 2nd ed., Elsevier, Amsterdam.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Database Developer

Module Code: DLBAIEDD

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

Prof. Dr. Ralf Kneuper (Database Modeling and Database Systems) / Sharam Dadashnia (Project: Build a Data Mart in SQL)

## Contributing Courses to Module

- Database Modeling and Database Systems (DLBCSDMDS01)
- Project: Build a Data Mart in SQL (DLBDSPBDM01)

## Module Exam Type

Module Exam	Split Exam
	<p><u>Database Modeling and Database Systems</u></p> <ul style="list-style-type: none"> <li>• Study Format "Distance Learning": Exam, 90 Minutes</li> </ul> <p><u>Project: Build a Data Mart in SQL</u></p> <ul style="list-style-type: none"> <li>• Study Format "Distance Learning": Portfolio</li> </ul>

## Weight of Module

see curriculum

**Module Contents****Database Modeling and Database Systems**

- Fundamentals of relational databases
- Simple database queries
- Entity/Relationship (E/R) Diagrams
- Database development
- Complex database queries across multiple tables
- Changing data in databases
- NoSQL database systems

**Project: Build a Data Mart in SQL**

This course is about the implementation of a practical database use case employing previously-acquired knowledge on pertaining approaches and methods.

**Learning Outcomes****Database Modeling and Database Systems**

On successful completion, students will be able to

- describe the basic concepts of the relational data model and distinguish them from each other.
- visually model data schemas.
- know SQL queries, read data from databases, change the data stock, and have experience in their use.
- design, create, and modify SQL queries and data schemas for SQL databases, and have experience using them.
- independently design database schemas and create database queries to solve concrete problems.
- know the most important NoSQL concepts and distinguish them from each other.

**Project: Build a Data Mart in SQL**

On successful completion, students will be able to

- transfer previously-acquired knowledge about database methods and approaches to practical use cases.
- design, architect, and implement a working data-mart solution.
- reason about design choices of and trade-offs between relevant implementation alternatives.
- critically evaluate said choices with respect to the stated design goal.
- describe and explain the resulting solution.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Data Science & Artificial Intelligence

**Links to other Study Programs of IUBH**

All Bachelor Programs in the IT & Technology fields

## Database Modeling and Database Systems

Course Code: DLBCSDMDS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

Stored data form the basis of many value chains of an information and knowledge society. The methodical structuring of data through data schemas therefore forms an important basis for storing information in such a way that it can be retrieved and processed quickly and easily. In addition to the structured storage of data, structured access to large amounts of data must also be possible. This course teaches students how to store data in relational data models and how to access stored data with SQL. In addition to relational database systems, modern DB systems (NoSQL) for storing and accessing data will be presented.

### Course Outcomes

On successful completion, students will be able to

- describe the basic concepts of the relational data model and distinguish them from each other.
- visually model data schemas.
- know SQL queries, read data from databases, change the data stock, and have experience in their use.
- design, create, and modify SQL queries and data schemas for SQL databases, and have experience using them.
- independently design database schemas and create database queries to solve concrete problems.
- know the most important NoSQL concepts and distinguish them from each other.

### Contents

1. Fundamentals of Relational Databases
  - 1.1 Basic Concepts of the Relational Data Model
  - 1.2 Find and Delete Records in the Database
  - 1.3 SQL and Relational Database Systems
2. Querying Data from a Single Table
  - 2.1 Query Data (SELECT)
  - 2.2 Query Data With Condition (WHERE)
  - 2.3 Sort Query Output (ORDER BY)
  - 2.4 Queries With Group Formation (GROUP BY)
  - 2.5 Subqueries With Nested SELECT Statements



3. Conception and Modeling of Relational Databases
  - 3.1 The Entity Relationship Model
  - 3.2 Relationships and Cardinalities in E/R Models
  - 3.3 Normal Forms of Databases
4. Creation of Relational Databases
  - 4.1 Logical Database Design Activities
  - 4.2 Mapping of the Conceptual Data Model into the Physical Data Model
  - 4.3 Generation of Tables in SQL Databases from E/R Diagrams
5. Complex Database Queries on Multiple Tables
  - 5.1 Composite Quantities (JOIN)
  - 5.2 Set Operations
  - 5.3 Data Views With CREATE VIEW
6. Manipulating Records in Databases
  - 6.1 Insert New Data Records (INSERT)
  - 6.2 Change Existing Records
  - 6.3 Transactions
7. NoSQL Database Systems
  - 7.1 Motivation and Basic Idea
  - 7.2 Selected Groups of NoSQL Systems

### Literature

#### Compulsory Reading

#### Further Reading

- Edlich, S./Friedland, A./Hampe, J./Brauer, B./Brückner, M. (2011): NoSQL. Einstieg in die Welt nichtrelationaler Web 2.0 Datenbanken. 2. Auflage, Hanser, München.
- Throll, M./Bartosch, O. (2010): Einstieg in SQL. Verstehen, einsetzen, nachschlagen. 4. Auflage, Galileo Computing, Bonn.
- Steiner, R. (2017): Grundkurs Relationale Datenbanken. Einführung in die Praxis der Datenbankentwicklung für Ausbildung, Studium und IT-Beruf. 9. Auflage, Springer Vieweg, Wiesbaden.
- Unterstein, M./Matthiessen, G. (2013): Anwendungsentwicklung mit Datenbanken. 5. Auflage, Springer Vieweg, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Project: Build a Data Mart in SQL

Course Code: DLBDSPBDM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

This course provides the opportunity to implement a realistic database use case scenario. A list of use case ideas is provided on the online learning platform. In addition, the students can contribute use case ideas of their own in accord with the tutor. The core aim is to apply the hitherto theoretical knowledge of database methods and approaches to solve a real-world application scenario. This entails reasoning about possible design and architectural choices in a rational way, as well as implementing them in a functioning database system.

### Course Outcomes

On successful completion, students will be able to

- transfer previously-acquired knowledge about database methods and approaches to practical use cases.
- design, architect, and implement a working data-mart solution.
- reason about design choices of and trade-offs between relevant implementation alternatives.
- critically evaluate said choices with respect to the stated design goal.
- describe and explain the resulting solution.

### Contents

- In this course, students apply their knowledge of data modeling and databases to implement a project use case of their choosing. All relevant artefacts, like use case evaluation, chosen implementation method, code, and outcomes, are documented in the form of a written project report.

**Literature****Compulsory Reading****Further Reading**

- Date, C. J. (2012). Database design and relational theory. Sebastopol, CA: O'Reilly.
- DeBarros, A. (2018). Practical SQL: A beginner's guide to storytelling with data. San Francisco, CA: No Starch Press.
- Harrington, J. L. (2016). Relational database design and implementation (4th ed.). Burlington, MA: Morgan Kaufmann.
- Hernandez, M. J. (2013). Database design for mere mortals: A hands-on guide to relational database design (3rd ed.). Boston, MA: Addison-Wesley.
- Viescas, J. (2018). SQL queries for mere mortals: A hands-on guide to data manipulation in SQL (4th ed.). Boston, MA: Addison-Wesley.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> yes
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSPBDM01

## Business Intelligence

Module Code: DLBCSEBI

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Prof. Dr. Sebastian Werning (Business Intelligence) / Prof. Dr. Sebastian Werning (Project: Business Intelligence)

### Contributing Courses to Module

- Business Intelligence (DLBCSEBI01)
- Project: Business Intelligence (DLBCSEBI02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Business Intelligence

- Study Format "Distance Learning": Exam, 90 Minutes

##### Project: Business Intelligence

- Study Format "Distance Learning": Written Assessment: Project Report

### Weight of Module

see curriculum

**Module Contents****Business Intelligence**

- Basics of mobile software development
- Android system architecture
- Development environment
- Core components of an Android app
- Interaction between application components
- Advanced techniques

**Project: Business Intelligence**

Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task.

**Learning Outcomes****Business Intelligence**

On successful completion, students will be able to

- explain the motivation, use cases, and basics of Business Intelligence.
- identify and explain techniques and methods for providing and modeling data, as well as types of data relevant to BI, differentiating between them.
- explain techniques and methods for the generation and storage of information and independently select suitable methods on the basis of concrete requirements.

**Project: Business Intelligence**

On successful completion, students will be able to

- independently design a solution to a practical problem in the field of Business Intelligence in order to then implement a prototype and document the results.
- identify and explain typical problems and challenges in the design and practical implementation of small BI solutions.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Computer Science & Software Development

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology fields



# Business Intelligence

Course Code: DLBCSEBI01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Business Intelligence (BI) is used to obtain information from company data that is relevant for targeted corporate management and the optimization of business activities. This course introduces and discusses techniques, procedures, and models for data provision, information generation, and analysis, as well the distribution of the information obtained. You will then be able to explain the various subject areas of data warehousing and independently select methods and techniques to meet specific requirements.

## Course Outcomes

On successful completion, students will be able to

- explain the motivation, use cases, and basics of Business Intelligence.
- identify and explain techniques and methods for providing and modeling data, as well as types of data relevant to BI, differentiating between them.
- explain techniques and methods for the generation and storage of information and independently select suitable methods on the basis of concrete requirements.

## Contents

1. Motivation and Conceptualization
  - 1.1 Motivation and Historical Development
  - 1.2 BI as a Framework
2. Data Provision
  - 2.1 Operative and Dispositive Systems
  - 2.2 The Data Warehouse Concept
  - 2.3 Architectural Variations
3. Data Warehouse
  - 3.1 ETL Process
  - 3.2 DWH and Data Mart
  - 3.3 ODS and Metadata

4. Modelling of Multidimensional Data Spaces
  - 4.1 Data Modeling
  - 4.2 OLAP Cubes
  - 4.3 Physical Storage
  - 4.4 Star and Snowflake Scheme
  - 4.5 Historicization
5. Analysis Systems
  - 5.1 Free Data Research and OLAP
  - 5.2 Reporting Systems
  - 5.3 Model-Based Analysis Systems
  - 5.4 Concept-Oriented Systems
6. Distribution and Access
  - 6.1 Information Distribution
  - 6.2 Information Access

**Literature****Compulsory Reading****Further Reading**

- Bachmann, R./Kemper, G. (2011): Raus aus der BI-Falle. Wie Business Intelligence zum Erfolg wird. 2. Auflage, mitp, Heidelberg.
- Bauer, A./Günzel, H. (2008): Data Warehouse Systeme. Architektur, Entwicklung, Anwendung. 3. Auflage, dpunkt.verlag, Heidelberg.
- Betz, R. (2015): Werde Jäger des verlorenen Schatzes. In: Immobilienwirtschaft, Heft 5, S. 1614–1164. (URL <https://www.haufe.de/download/immobilienwirtschaft-ausgabe-052015-immobilienwirtschaft-fachmagazin-fuer-management-recht-praxis-303530.pdf> [letzter Zugriff: 27.02.2017]).
- Bodendorf, F. (2006): Daten- und Wissensmanagement. 2. Auflage, Springer, Berlin.
- Chamoni, P./Gluchowski, P. (Hrsg.) (2006): Analytische Informationssysteme Business Intelligence-Technologien und -Anwendungen. Springer, Berlin.
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- Kemper, H.-G./Baars, H./Mehanna, W. (2010): Business Intelligence – Grundlagen und praktische Anwendungen. Eine Einführung in die IT-basierte Managementunterstützung. 3. Auflage, Vieweg+Teubner, Stuttgart.
- Turban, E. et al. (2010): Business Intelligence. A Managerial Approach. 2. Auflage, Prentice Hall, Upper Saddle River (NJ).

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Business Intelligence

Course Code: DLBCSEBI02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

Using well-known methods and techniques from the field of Business Intelligence, students will work independently on a practical question in this course. At the end of the course you will be able to independently design and prototype Business Intelligence applications based on concrete requirements.

### Course Outcomes

On successful completion, students will be able to

- independently design a solution to a practical problem in the field of Business Intelligence in order to then implement a prototype and document the results.
- identify and explain typical problems and challenges in the design and practical implementation of small BI solutions.

### Contents

- Implementation and documentation of practical questions regarding the use of Business Intelligence applications. Typical scenarios are, for example, "Management of BI projects", "Design of multidimensional data models" and "Prototypical implementation of small BI applications".

### Literature

#### Compulsory Reading

#### Further Reading

- Brenner, W./Uebernicketel, F. (2015): Design Thinking. Das Handbuch. Frankfurter Allgemeine Buch, Frankfurt a. M.
- Brown, T. (2008): Design Thinking. In: Harvard Business Review, Heft Juni, S. 84–95.
- Meinel, C./Weinberg, U./Krohn, T. (Hrsg.) (2015): Design Thinking Live. Wie man Ideen entwickelt und Probleme löst. Murmann, Hamburg.
- Uebernicketel, F./Brenner, W. (2016): Design Thinking. In: Hoffmann, C. P. et al. (Hrsg.): Business Innovation: Das St. Galler Modell. Springer, Wiesbaden, S. 243–265.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Data Analyst

Module Code: DLBDEDA

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Advanced Data Analysis) / N.N. (Project: Data Analysis)

### Contributing Courses to Module

- Advanced Data Analysis (DLBDEDA01)
- Project: Data Analysis (DLBDEDA02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Advanced Data Analysis

- Study Format "Distance Learning": Exam, 90 Minutes

##### Project: Data Analysis

- Study Format "Distance Learning": Portfolio

### Weight of Module

see curriculum

<p><b>Module Contents</b></p> <p><b>Advanced Data Analysis</b></p> <ul style="list-style-type: none"> <li>▪ Business performance analytics</li> <li>▪ Text mining</li> <li>▪ Web- and social media analytics</li> <li>▪ Experimentation and testing</li> </ul> <p><b>Project: Data Analysis</b></p> <p>Transfer of methodological knowledge to the implementation of real-world analytics use cases from the above-mentioned problem domains.</p>	
<p><b>Learning Outcomes</b></p> <p><b>Advanced Data Analysis</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ identify important design considerations for business KPIs.</li> <li>▪ explain various topics in business process analytics.</li> <li>▪ utilize established techniques for web data analytics.</li> <li>▪ understand analytical approaches to text mining and semantic analysis.</li> <li>▪ disambiguate relevant questions in social media analytics.</li> <li>▪ use the techniques and methods for experimentation and testing.</li> </ul> <p><b>Project: Data Analysis</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ formulate and implement a real-world analytical use case.</li> <li>▪ analyze the suitability of different possible approaches with respect to the project task.</li> <li>▪ transfer acquired specialized analytical knowledge to real-world use cases.</li> <li>▪ derive relevant design choices from the given project setting.</li> <li>▪ make apposite choices with respect to implementation alternatives.</li> <li>▪ select appropriate resources</li> </ul>	
<p><b>Links to other Modules within the Study Program</b></p> <p>This module is similar to other modules in the fields of Data Science &amp; Artificial Intelligence</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All Bachelor Programmes in the IT &amp; Technology fields</p>



# Advanced Data Analysis

Course Code: DLBDEDA01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

This course introduces several advanced analytics subjects of practical relevance. The subject areas covered span from business performance measurement and analytics, text mining, and web- and social media analytics to current trends in experimental design and setup. Along this journey topics such as the design of key performance indicators (KPIs), business process analytics, word frequency and semantic analysis, data science on clickstreams, social media interactions, and multi-armed bandit testing are addressed.

## Course Outcomes

On successful completion, students will be able to

- identify important design considerations for business KPIs.
- explain various topics in business process analytics.
- utilize established techniques for web data analytics.
- understand analytical approaches to text mining and semantic analysis.
- disambiguate relevant questions in social media analytics.
- use the techniques and methods for experimentation and testing.

## Contents

1. Business Performance Analytics
  - 1.1 KPI design considerations
  - 1.2 Common business performance indicators
  - 1.3 Business process mining
2. Text Analytics
  - 2.1 Word and document frequency (TF-IDF)
  - 2.2 Semantic analysis
3. Web Analytics
  - 3.1 Web metrics
  - 3.2 Clickstream analytics
  - 3.3 Recommender systems

4. Social Network Mining
  - 4.1 Introduction to social media analytics
  - 4.2 Mining common social media platforms
5. Testing and Experimentation
  - 5.1 Practical A/B testing
  - 5.2 Multivariate tests
  - 5.3 Multi-armed bandit testing

#### Literature

#### Compulsory Reading

#### Further Reading

- Hapke, H. / Howard, C. / Lane, H. (2019): Natural language processing in action.: Manning Publications, Shelter Island, NY.
- Kaushik, A. (2009): Web analytics 2.0: The art of online accountability and science of customer centricity. Sybex, Hoboken, NJ.
- Klassen, M. / Russell, M. A. (2019): Mining the social web. 3rd edition. O'Reilly Media, Sebastopol, CA.
- Marr, B. (2012): Key Performance Indicators (KPI). Pearson, Boston, MA.
- Neely, A. (Ed.) (2011): Business performance measurement: Unifying theory and integrating practice. 2nd edition, Cambridge University Press, Cambridge.
- Ojeda, T. / Bilbro, R. / Bengfort, B. (2018): Applied text analysis with Python. O'Reilly Media, Sebastopol, CA.
- Parmenter, D. (2015): Key performance indicators: Developing, implementing, and using winning KPIs. 3rd edition, John Wiley & Sons, Chichester.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Project: Data Analysis

Course Code: DLBDSEDA02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The focus of this course is the implementation of a real-world, advanced analytics use case in the form of a student project. Primary subject areas for this practical work include business performance analytics, text mining, web- and social analytics, and experimentation and testing. The goal is for students to demonstrate they can transfer the theoretical knowledge acquired in Advanced Data Analysis (DLBDSEDA01) to an implementation scenario that closely mimics project work in a professional data science setting.

### Course Outcomes

On successful completion, students will be able to

- formulate and implement a real-world analytical use case.
- analyze the suitability of different possible approaches with respect to the project task.
- transfer acquired specialized analytical knowledge to real-world use cases.
- derive relevant design choices from the given project setting.
- make apposite choices with respect to implementation alternatives.
- select appropriate resources

### Contents

- This course covers the practical implementation of the approaches and techniques covered in the course Advanced Data Analysis (DLBDSEDA01) in a project-oriented setting. Each participant must produce a project report detailing and documenting their work. Project tasks are chosen from a list or suggested by the students in accord with the tutor.

**Literature****Compulsory Reading****Further Reading**

- Hapke, H. / Howard, C. / Lane, H. (2019): Natural language processing in action.: Manning Publications, Shelter Island, NY.
- Kaushik, A. (2009): Web analytics 2.0: The art of online accountability and science of customer centricity. Sybex, Hoboken, NJ.
- Klassen, M. / Russell, M. A. (2019): Mining the social web. 3rd edition. O'Reilly Media, Sebastopol, CA.
- Marr, B. (2012): Key Performance Indicators (KPI). Pearson, Boston, MA.
- Neely, A. (Ed.) (2011): Business performance measurement: Unifying theory and integrating practice. 2nd edition, Cambridge University Press, Cambridge.
- Ojeda, T. / Bilbro, R. / Bengfort, B. (2018): Applied text analysis with Python. O'Reilly Media, Sebastopol, CA.
- Parmenter, D. (2015): Key performance indicators: Developing, implementing, and using winning KPIs. 3rd edition, John Wiley & Sons, Chichester.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Portfolio

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Augmented, Mixed and Virtual Reality

Module Code: DLBMIAMVR\_E

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Augmented, Mixed and Virtual Reality) / N.N. (X-Reality Project)

### Contributing Courses to Module

- Augmented, Mixed and Virtual Reality (DLBMIAMVR01\_E)
- X-Reality Project (DLBMIAMVR02\_E)

### Module Exam Type

#### Module Exam

#### Split Exam

Augmented, Mixed and Virtual Reality

- Study Format "Distance Learning": Exam, 90 Minutes

X-Reality Project

- Study Format "Distance Learning": Written Assessment: Project Report

### Weight of Module

see curriculum

<p><b>Module Contents</b></p> <p><b>Augmented, Mixed and Virtual Reality</b></p> <ul style="list-style-type: none"> <li>▪ Definition and Differentiation of Terms</li> <li>▪ Fields of Application and Examples</li> <li>▪ Aspects of Human Perception</li> <li>▪ Augmented and Virtual Reality Output Devices</li> <li>▪ Input Devices</li> <li>▪ Interaction in Virtual and Augmented Realities</li> <li>▪ Aspects of XR Application Development</li> <li>▪ Future of XR Technologies</li> </ul> <p><b>X-Reality Project</b></p> <p>Development of AR-/VR-Application; Design, Implementation and Documentation; Challenges and Problems</p>	
<p><b>Learning Outcomes</b></p> <p><b>Augmented, Mixed and Virtual Reality</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ name the characteristics and differences of augmented, mixed, and virtual reality techniques.</li> <li>▪ describe the importance of sensual perception in AR and VR.</li> <li>▪ explain the basic technical features of AR and VR systems.</li> <li>▪ explain the different interaction possibilities in AR and VR applications.</li> <li>▪ perform selected development processes for AR and VR applications.</li> </ul> <p><b>X-Reality Project</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ implement a small AR/VR application by themselves.</li> <li>▪ experiment with the concept of AR/VR applications.</li> <li>▪ discuss challenges and issues in AR/VR software development.</li> <li>▪ document the concept and implementation of independently developed AR/VR applications and accumulated experience in a project report.</li> </ul>	
<p><b>Links to other Modules within the Study Program</b></p> <p>This module is similar to other modules in the fields of Computer Science &amp; Software Development</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All Bachelor Programs in the IT &amp; Technology fields</p>



# Augmented, Mixed and Virtual Reality

Course Code: DLBMIAMVR01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Augmented, mixed and virtual reality (AR, MR and VR) technologies are becoming increasingly important in a wide range of application areas. In this context, novel hardware devices and forms of interaction are used. In addition to the technical foundations, this course covers aspects of human perception and approaches for developing AR/VR applications. To give the students a knowledge of the field, the terms augmented, mixed, and virtual reality will be defined and differentiated and examples of their use will be demonstrated. In order to simulate the existence of a virtual world or virtual objects to users, aspects of human perception have to be used. Based on the fundamentals of human information processing, the course highlights the phenomena, problems, and solutions that have to be considered in AR and VR applications. AR and VR systems can be implemented in different ways. This course addresses different output forms, tracking methods and interaction possibilities. In addition, other techniques that are specifically relevant in the AR field will be represented. Software development in the AR and VR field may require the application of special processes. This course teaches selected approaches that are helpful in designing, prototyping, and testing AR and VR applications. The course concludes with a view at the future applications and the research potential of augmented, mixed, and virtual reality.

## Course Outcomes

On successful completion, students will be able to

- name the characteristics and differences of augmented, mixed, and virtual reality techniques.
- describe the importance of sensual perception in AR and VR.
- explain the basic technical features of AR and VR systems.
- explain the different interaction possibilities in AR and VR applications.
- perform selected development processes for AR and VR applications.

## Contents

1. Introduction to Augmented, Mixed and Virtual Reality
  - 1.1 Definition and Differentiation of Terms
  - 1.2 Fields of Application and Examples

2. Aspects of Human Perception
  - 2.1 Human Information Processing
  - 2.2 Visual Perception
  - 2.3 Multisensory Perception
  - 2.4 Phenomena, Problems and Solutions
3. Virtual Reality Output Devices
  - 3.1 Mounts for Smartphones
  - 3.2 Simple 3-Degrees-of-Freedom VR Glasses
  - 3.3 6-Degrees-of-Freedom-VR
  - 3.4 Multisensor Technology
4. Augmented Reality Output Devices
  - 4.1 Tracking
  - 4.2 Optical See-Through vs. Video See-Through vs. Projection
  - 4.3 General Differences between Devices
5. Input Devices
  - 5.1 Controller and Other Devices
  - 5.2 Touchpads
  - 5.3 Voice Commands
  - 5.4 Finger Tracking
  - 5.5 Eye Tracking
  - 5.6 Neurofeedback
6. Interaction in Virtual and Augmented Realities
  - 6.1 Fundamentals of Human-Computer Interaction
  - 6.2 Selection
  - 6.3 Manipulation of Objects
  - 6.4 Navigation
  - 6.5 Perceptual Variables
7. Aspects of Development
  - 7.1 Iterative Development Approaches for VR/AR Applications
  - 7.2 Design Techniques
  - 7.3 Prototyping
  - 7.4 Evaluation

8. The Future of Augmented, Mixed and Virtual Reality
  - 8.1 Outlook on Future Applications
  - 8.2 Focus Points for Future Research

## Literature

### Compulsory Reading

### Further Reading

- Billinghurst, M./Clark, A./Lee, G.: "A Survey of Augmented Reality". In: Foundations and Trends in Human-Computer Interaction, Vol. 8, Nr. 2-3, S.73-272.
- Jerald, J. (2016): The VR Book. Human-Centered Design for Virtual Reality. ACM und Morgan & Claypool.
- Schmalstieg, D./Höllerer, T. (2016): Augmented Reality. Principles and Practice. Addison-Wesley.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## X-Reality Project

Course Code: DLBMIAMVR02\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The students create an application from the field of augmented or virtual reality by themselves and document its conception and implementation as well as collected experiences. The development of an AR/VR application may include special steps that are not known from classic software applications. In this context, AR- or VR-typical elements of the application should be explicitly highlighted and challenges and problems should be addressed.

### Course Outcomes

On successful completion, students will be able to

- implement a small AR/VR application by themselves.
- experiment with the concept of AR/VR applications.
- discuss challenges and issues in AR/VR software development.
- document the concept and implementation of independently developed AR/VR applications and accumulated experience in a project report.

### Contents

- The students work on a project from the field of augmented or virtual reality. They design and implement an AR/VR application based on a concrete task. The development of the application as well as collected experiences are documented in a project report. The project report first presents the project goal as well as the topic and context of the application. Then the requirements, the conception and the implementation of the application are described. During the documentation, AR- or VR-typical elements will be explicitly highlighted. The report concludes by highlighting the challenges and issues that arose during development.

### Literature

#### Compulsory Reading

#### Further Reading

- Buttfield-Addison, P., Manning, J., Nugent, T. (2019): Unity Game Development Cookbook: Essentials for Every Game. O'Reilly.
- Linowes, J. (2015): Unity virtual reality projects. Explore the world of virtual reality by building immersive and fun VR projects using Unity 3D. Packt Publishing.
- Linowes, J./Babilinski, K. (2017): Augmented Reality for Developers. Build practical augmented reality applications with Unity, ARCore, ARKit, and Vuforia. Packt Publishing.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Project
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Written Assessment: Project Report

<b>Student Workload</b>					
<b>Self Study</b> 120 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

# International Marketing and Branding

Module Code: DLBDSEIMB

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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## Module Coordinator

Caterina Fox (International Marketing) / N.N. (International Brand Management)

## Contributing Courses to Module

- International Marketing (DLBDSEIMB01)
- International Brand Management (DLBDSEIMB02)

## Module Exam Type

### Module Exam

### Split Exam

#### International Marketing

- Study Format "Distance Learning": Exam, 90 Minutes

#### International Brand Management

- Study Format "Distance Learning": Module Exam (50)

## Weight of Module

see curriculum

**Module Contents****International Marketing**

- International marketing strategy
- Cultural differences and their significance for marketing
- International marketing mix (product, price, promotion, and distribution decisions in an international environment)
- International market research and consumer behavior
- Ethical aspects in international marketing
- International marketing controlling and six sigma

**International Brand Management**

- Basics of brand management
- Framework conditions for brands in international markets
- Strategies and concepts of international brands
- Brand architectures and brand extension options
- Brand management and communication
- Brand management according to the stakeholder concept
- Brand control and protection

**Learning Outcomes****International Marketing**

On successful completion, students will be able to

- understand basic aspects of international strategic marketing.
- analyze cultural differences and their impact on international marketing.
- apply selected concepts of the international marketing mix.
- describe the possibilities of international market research and its influence on consumer behavior.
- recognize the necessity of international brand controlling and quality management.
- reproduce theoretical knowledge using case studies.

**International Brand Management**

On successful completion, students will be able to

- recognize the significance of a brand and the general conditions under which brands operate, as well as the associated tasks of brand management.
- describe the components of a brand and its management.
- explain the positioning of brands on regional, national and international markets.
- understand the role of brand evaluation and compare the most common measurement techniques.
- give an overview of the importance of trademark protection and suggest strategies for preventing counterfeiting.
- conceive of brand strategies and measures for the avoidance or occurrence of brand crises.



**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Marketing & Sales

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Marketing & Communication fields

# International Marketing

Course Code: DLBDSEIMB01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

Students are taught the necessity for strategic marketing in an international context. They will learn about essential cultural differences and their influences on international marketing management. The basic decisions, standardizations, and adaptations in international marketing are experienced by the students on the basis of different concepts in the international marketing mix. The necessity of international market research, strategic planning, and control are taught to the students, along with the ethical aspects in international marketing. The students analyze current topics in international marketing management and reflect on them in connection with the concepts they have learned in this course.

## Course Outcomes

On successful completion, students will be able to

- understand basic aspects of international strategic marketing.
- analyze cultural differences and their impact on international marketing.
- apply selected concepts of the international marketing mix.
- describe the possibilities of international market research and its influence on consumer behavior.
- recognize the necessity of international brand controlling and quality management.
- reproduce theoretical knowledge using case studies.

## Contents

1. Strategic International Marketing
  - 1.1 Internationalization
  - 1.2 Theoretical Foundations of International Market Entry Strategies
  - 1.3 Forms of International Market Entry
2. Cultural Differences as an Aspect of International Marketing
  - 2.1 Overview of Culture
  - 2.2 Cultural Model Based on Hofstede
  - 2.3 Cultural Model Based on Trompenaars

3. Case Studies in International Market Entry and Marketing Strategies
  - 3.1 Case Study: Nivea in South Korea
  - 3.2 Case Study: Bosch and Siemens Hausgeräte GmbH in China
  - 3.3 Case Study: Siemens Mobile in China
  - 3.4 Case Study: Siemens in China
4. International Product Management and Product Development
  - 4.1 Goals of International Product Management
  - 4.2 Framework Conditions for International Product Management
  - 4.3 International Product Decisions
  - 4.4 International Product Development
5. Exchange Rate Fluctuations and International Price Calculation
  - 5.1 Tasks and Objectives of International Price Management
  - 5.2 Factors Influencing International Price Management
  - 5.3 Instruments of International Price Management
6. International Communication and International Sales Policy
  - 6.1 International Communication Management
  - 6.2 International Sales Management
7. International Marketing and Ethics
  - 7.1 Overview of International Marketing and Ethics
  - 7.2 Business Ethics in International Companies
  - 7.3 Case Study: Nestlé
8. Applied Market Research and Its Influence on Consumer Behavior
  - 8.1 Scope of International Market Research
  - 8.2 Requirements for International Market Research Information
  - 8.3 International Secondary Research
  - 8.4 International Primary Research
9. Monitoring and Control in International Marketing
  - 9.1 Controlling in International Management
10. Six Sigma, Brand Management, and Rebranding
  - 10.1 Six Sigma: Basics, Definitions, and Processes
  - 10.2 Brand Management
  - 10.3 Rebranding

**Literature****Compulsory Reading****Further Reading**

- Backhaus, K./Voeth, M. (2010): Internationales Marketing. Schäffer-Poeschel Stuttgart.
- Berndt, R./Altobelli, C. F./Sander, M. (2010): Internationales Marketing-Management. 4. Auflage, Springer, Berlin.
- Homburg, C./Krohmer, H. (2009): Marketingmanagement. Strategie – Instrumente – Umsetzung – Unternehmensführung. 3. Auflage, Gabler, Wiesbaden.
- Horx, M. (2005): Wie wir leben werden. Unsere Zukunft beginnt jetzt. Campus, Frankfurt a. M.
- Kotabe, M./Helsen, K. (2008): Global Marketing Management. 4. Auflage, Wiley, Hoboken (NJ).
- Kotler, P./Keller K. L./Bliemel, F. (2007): Marketing-Management. Strategien für wertschaffendes Handeln. 12. Auflage, Pearson Studium, Stuttgart.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# International Brand Management

Course Code: DLBDSEIMB02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim of this course is to deepen and expand the knowledge acquired in the introductory elective course International Marketing. The value of a brand is a decisive competitive advantage for companies in international business. Brands create long-term and profitable customer relationships. Brands are therefore valuable assets for companies and organizations. Students learn the basics of brand management before moving on to the concepts and success factors of international brand management. Students also become familiar with the structure of brand architectures and the possibilities of brand extensions. The fact that different stakeholder groups must be taken into account in brand management is communicated to the students on the basis of the stakeholder concept. In addition, the students get to know the various methods for measuring brand value and brand controlling. The aspects of trademark protection that are particularly important in an international environment will be dealt with conclusively.

## Course Outcomes

On successful completion, students will be able to

- recognize the significance of a brand and the general conditions under which brands operate, as well as the associated tasks of brand management.
- describe the components of a brand and its management.
- explain the positioning of brands on regional, national and international markets.
- understand the role of brand evaluation and compare the most common measurement techniques.
- give an overview of the importance of trademark protection and suggest strategies for preventing counterfeiting.
- conceive of brand strategies and measures for the avoidance or occurrence of brand crises.

## Contents

1. Basics of Brand Management
  - 1.1 Brand Significance and Brand Understanding
  - 1.2 Market Conditions
  - 1.3 Tasks and Goals of Brand Management

2. Brand Identity, Brand Positioning, and Brand Personality
  - 2.1 Brand Identity as the Basis of Brand Management
  - 2.2 Brand Positioning
  - 2.3 Brand Image
  - 2.4 Brand Personality
3. Brand Strategies
  - 3.1 The Challenges for Brand Strategies
  - 3.2 Brand Strategies for New Products
  - 3.3 Trademark Licensing
4. International Branding
  - 4.1 Importance of Branding for International Companies
  - 4.2 Brand Concepts for International Brands
  - 4.3 Factors for Successful International Brands
5. Brand Architectures and Types of Branding
  - 5.1 Brand Systems
  - 5.2 Co-branding and Hybrid Branding
6. Brand Management and Communication
  - 6.1 Classic Brand Communication
  - 6.2 Brand Communication on the Internet
7. Brand Expansion
  - 7.1 Basics of Brand Expansion
  - 7.2 Opportunities and Risks of Brand Expansion
  - 7.3 Ideal Typical Sequence of the Brand Expansion Process
8. Brand Management According to the Stakeholder Concept
  - 8.1 Basics of Brand Management According to the Stakeholder Principle
  - 8.2 Stakeholder Groups: Consumer Stakeholder Groups
  - 8.3 Stakeholder Groups: Shareholders and Financial Investors
  - 8.4 Stakeholder Groups: Employees
  - 8.5 Stakeholder Groups: Suppliers and the Public

9. Brand Control
  - 9.1 Basics of Brand Controlling
  - 9.2 Importance and Measurement of Brand Value (Brand Status Analyses)
  - 9.3 Practical Methods for Measuring Brand Value
10. Trademark Protection
  - 10.1 Object of Trademark Protection
  - 10.2 Origin of Trademark Protection
  - 10.3 Trademark Infringements

## Literature

### Compulsory Reading

### Further Reading

- Baumgarth, C. (2008): Markenpolitik. Markenwirkungen – Markenführung – Markencontrolling. 3. Auflage, Gabler, Wiesbaden.
- Berndt, R./Altobelli, C. F./Sander, M. (2010): Internationales Marketing-Management. 4. Auflage, Springer, Berlin.
- Esch, F.-R. (2010): Strategie und Technik der Markenführung. 6. Auflage, Vahlen, München.
- Gelder, S. v. (2003): Global Brand Strategy. Unlocking Brand Potential Across Countries, Cultures and Markets. Kogan Page, London.
- Homburg, C./Krohmer, H. (2009): Marketingmanagement. Strategie – Instrumente – Umsetzung – Unternehmensführung. 3. Auflage, Gabler, Wiesbaden.
- Keller, K. L. (2007): Strategic Brand Management. Building, Measuring and Managing Brand Equity. 3. Auflage, Prentice Hall International, Edinburgh.
- Kotler, P./Keller K. L./Bliemel, F. (2007): Marketing-Management. Strategien für wertschaffendes Handeln. 12. Auflage, Pearson Studium, Stuttgart.
- Meffert, H./Burmam, C./Koers, M. (Hrsg.) (2005): Markenmanagement. Identitätsorientierte Markenführung und praktische Umsetzung. 2. Auflage, Gabler, Wiesbaden.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEIMB02

## Applied Sales

Module Code: DLBDSEAS

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

Prof. Dr. Patrick Geus (Applied Sales I) / Prof. Dr. Patrick Geus (Applied Sales II)

### Contributing Courses to Module

- Applied Sales I (DLBDSEAS01)
- Applied Sales II (DLBDSEAS02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Applied Sales I

- Study Format "Distance Learning": Exam

##### Applied Sales II

- Study Format "Distance Learning": Exam

### Weight of Module

see curriculum

### **Module Contents**

#### **Applied Sales I**

- Fundamentals of Applied Sales
- The Distribution System
- Personal Sales
- Sales Plans
- New Customer Acquisition
- A Sales Visit
- Conversational Tactics
- Conducting Negotiations
- Other Sales Channels

#### **Applied Sales II**

- Marketing and Sales
- Customer Satisfaction as a Success Factor
- Personalities in Sales
- Customer-Oriented Communication
- Presentation and Rhetoric
- Customer Loyalty
- Networking
- Case Study

## Learning Outcomes

### Applied Sales I

On successful completion, students will be able to

- understand the fundamentals of applied sales and place them in the context of the company.
- understand the interaction of the individual facets of applied sales.
- differentiate between and evaluate individual sales systems.
- describe current sales types and sales characteristics.
- oversee and classify the entire sales process from customer acquisition to customer retention.
- understand the basics of sales and negotiation management and apply them.
- name the usual sales instruments, recognize their advantages and disadvantages, and reflect on essential fields of application and possibilities.

### Applied Sales II

On successful completion, students will be able to

- understand the interaction and the respective areas of responsibility of marketing and sales.
- reflect on and classify the goals and measures within the framework of the applied sales system.
- assess the relevance of customer satisfaction and retention. In addition, the students will be familiar with the central design elements of CRM.
- reflect on and assess alternative approaches to customer loyalty and relationship management and apply them in business practice.
- understand the meaning of the terms customer life cycle and customer value, and develop approaches to manage them in the sense of the respective sales targets.
- use descriptive presentation techniques in order to convince customers and other sales partners.
- understand the relevance of networking and develop strategies to broaden the contact base.
- develop and evaluate their own market analyses and sales concepts on the basis of practical experience within the framework of the case study.

#### Links to other Modules within the Study Program

This module is similar to other modules in the fields of Marketing & Sales

#### Links to other Study Programs of IUBH

All Bachelor Programmes in the Marketing & Communication fields

## Applied Sales I

Course Code: DLBDSEAS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The demands on sales thinking are growing every day. Globalized demand combined with high competition is making it increasingly difficult for companies to compete for customers. At the same time, customers are becoming better informed, while traditional supply markets are saturated and at overcapacity. In order to be successful in such an environment, sales thinking and action are required along with a new type of salesperson. Within the course Applied Sales I (Introduction), the participants are familiarized with the basic concepts of applied sales. You will learn about sales organization, dealing with alternative sales channels, and get to know the dedicated sales planning process. The contents of the module are complemented by the successful acquisition of new customers, whereby particular attention is paid to the organization and implementation of customer visits and the conduct of discussions and negotiations.

### Course Outcomes

On successful completion, students will be able to

- understand the fundamentals of applied sales and place them in the context of the company.
- understand the interaction of the individual facets of applied sales.
- differentiate between and evaluate individual sales systems.
- describe current sales types and sales characteristics.
- oversee and classify the entire sales process from customer acquisition to customer retention.
- understand the basics of sales and negotiation management and apply them.
- name the usual sales instruments, recognize their advantages and disadvantages, and reflect on essential fields of application and possibilities.

### Contents

1. Fundamentals of Applied Sales and Distribution
  - 1.1 Tasks and Forms of Applied Distribution
  - 1.2 Marketing as the Basis of Sales
  - 1.3 Distribution, Sales, and Other Terms
  - 1.4 Sales in Different Economic Sectors

2. The Distribution System
  - 2.1 Forms of Sales
  - 2.2 Sales Organisation
  - 2.3 Key Account Management
  - 2.4 Multi-Channel Distribution
3. Personal Sales
  - 3.1 The "New Sellers"
  - 3.2 Requirements for Sales Personalities
  - 3.3 The Key Account Manager
  - 3.4 Task of Sales Managers
4. Sales Plan
  - 4.1 Tasks and Objectives of Sales Management
  - 4.2 Observation of Competition in the Context of Sales Management
  - 4.3 Potential Analyses and Sales Planning
  - 4.4 Sales Control and Visit Strategies
5. New Customer Acquisition
  - 5.1 Identification of New Customer Potential
  - 5.2 Customer Relationship Management and Customer Acquisition
  - 5.3 Trade Fairs and Events
  - 5.4 Networking
6. The Sales Visit
  - 6.1 Frequency and Preparation of Visits
  - 6.2 Conduct of a Visit
  - 6.3 Visit Reports and Follow-Up
  - 6.4 Aftercare and Follow-Up
7. Conversational Tactics
  - 7.1 Structured Conversation Preparation
  - 7.2 Goal-Oriented Conversation: The D.A.L.A.S Model
  - 7.3 Questioning Techniques

8. Conducting Negotiations
  - 8.1 Psychology of Negotiation
  - 8.2 Negotiation Structure
  - 8.3 Objection Handling
  - 8.4 Price Negotiations
  
9. Other Sales Channels
  - 9.1 Telemarketing
  - 9.2 Catalogue and Brochure Sales
  - 9.3 Internet and E-Commerce

#### Literature

#### Compulsory Reading

#### Further Reading

- Dannenberg, H./Zupancic, D. (2010): Spitzenleistungen im Vertrieb. Optimierungen im Vertriebs- und Kundenmanagement. 2. Auflage, Gabler, Wiesbaden.
- Eicher, H. (2006): Die geheimen Spielregeln im Verkauf. Wissen, wie der Kunde tickt. Campus, Frankfurt a. M.
- Herndl, K. (2014): Führen im Vertrieb. So unterstützen Sie Ihre Mitarbeiter direkt und konsequent. 4. Auflage, Gabler, Wiesbaden.
- Limbeck, M. (2016): Das neue Hardselling. Verkaufen heißt verkaufen – So kommen Sie zum Abschluss. 6. Auflage, Gabler, Wiesbaden.
- Schneider, W./Henning, A. (2008): Lexikon Kennzahlen für Marketing und Vertrieb. Das Marketing-Cockpit von A – Z. 2. Auflage, Springer, Berlin/Heidelberg.
- Winkelmann, P. (2012): Marketing und Vertrieb. Fundamente für die Marktorientierte Unternehmensführung. 8. Auflage, Oldenbourg, München.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Applied Sales II

Course Code: DLBDSEAS02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

The course Applied Sales II builds on the basics taught in the course "Applied Sales I" and broadens and deepens them. First, the tension between marketing and sales is examined in more detail. Based on this, essential backgrounds and central target figures for successful sales management (e.g., customer satisfaction and loyalty as well as the customer life cycle) are derived and operationalized in order to create the basis for efficient and effective customer relationship management. As the process progresses, attention will also be paid to mental processes and consumer behavior in general. In addition, strategies and paths to successful negotiation are deepened and supplemented by convincing communication techniques. The course concludes with a case study in the course of which the students have the opportunity to apply what they have learned in a practice-oriented manner.

### Course Outcomes

On successful completion, students will be able to

- understand the interaction and the respective areas of responsibility of marketing and sales.
- reflect on and classify the goals and measures within the framework of the applied sales system.
- assess the relevance of customer satisfaction and retention. In addition, the students will be familiar with the central design elements of CRM.
- reflect on and assess alternative approaches to customer loyalty and relationship management and apply them in business practice.
- understand the meaning of the terms customer life cycle and customer value, and develop approaches to manage them in the sense of the respective sales targets.
- use descriptive presentation techniques in order to convince customers and other sales partners.
- understand the relevance of networking and develop strategies to broaden the contact base.
- develop and evaluate their own market analyses and sales concepts on the basis of practical experience within the framework of the case study.

**Contents**

1. Marketing and Sales
  - 1.1 Marketing Tasks and Functions
  - 1.2 Sales Marketing in Different Economic Sectors
  - 1.3 Relationship Marketing
  - 1.4 International Marketing and Sales Cooperations
2. Customer Satisfaction as a Success Factor
  - 2.1 Customer Relationship Management (CRM)
  - 2.2 The CRM Success Chain
  - 2.3 Customer Relationship Strategies
3. Personalities in Sales
  - 3.1 Sales Personalities and Differentiation
  - 3.2 Selling in Teams
  - 3.3 Negotiating With Committees
4. Customer-Oriented Communication
  - 4.1 Communication Tasks in Sales
  - 4.2 Sales Promotion by Sales Staff
  - 4.3 Team Sales Promotion
  - 4.4 Sales Promotion by the Company
5. Presentation and Rhetoric
  - 5.1 Rhetoric in Sales
  - 5.2 Presentation Techniques
  - 5.3 Nonverbal Communication
6. Customer Loyalty
  - 6.1 Customer Retention Management
  - 6.2 Customer Programs and Other Customer Loyalty Tools
  - 6.3 Complaint Management
7. Networking
  - 7.1 Network Competencies in the Company
  - 7.2 Building and Shaping Relationships
  - 7.3 Networking via Social Media

- |   |
|---|
| 8. Case Study in IQ Media Marketing                   |
| 8.1 The Market Situation                              |
| 8.2 The Marketing Situation                           |
| 8.3 IQ Media Marketing and IQ Digital Media Marketing |

<b>Literature</b>
<b>Compulsory Reading</b>
<b>Further Reading</b>
<ul style="list-style-type: none"><li>Dannenberg, H./Zupancic, D. (2010): Spitzenleistungen im Vertrieb. Optimierungen im Vertriebs- und Kundenmanagement. 2. Auflage, Gabler, Wiesbaden.</li><li>Eicher, H. (2006): Die geheimen Spielregeln im Verkauf. Wissen, wie der Kunde tickt. Campus, Frankfurt a. M.</li><li>Herndl, K. (2014): Führen im Vertrieb. So unterstützen Sie Ihre Mitarbeiter direkt und konsequent. 4. Auflage, Gabler, Wiesbaden.</li><li>Limbeck, M. (2016): Das neue Hardselling. Verkaufen heißt verkaufen – So kommen Sie zum Abschluss. 6. Auflage, Gabler, Wiesbaden.</li><li>Schneider, W./Henning, A. (2008): Lexikon Kennzahlen für Marketing und Vertrieb. Das Marketing-Cockpit von A – Z. 2. Auflage, Springer, Berlin/Heidelberg.</li><li>Winkelmann, P. (2012): Marketing und Vertrieb. Fundamente für die Marktorientierte Unternehmensführung. 8. Auflage, Oldenbourg, München.</li></ul>

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

DLBDSEAS02

# Supply Chain Management

Module Code: DLBDESCM

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

N.N. (Supply Chain Management I ) / N.N. (Supply Chain Management II)

## Contributing Courses to Module

- Supply Chain Management I (DLBDESCM01)
- Supply Chain Management II (DLBDESCM02)

## Module Exam Type

### Module Exam

### Split Exam

#### Supply Chain Management I

- Study Format "Distance Learning": Module Exam (50)

#### Supply Chain Management II

- Study Format "Distance Learning": Module Exam (50)

## Weight of Module

see curriculum

### **Module Contents**

#### **Supply Chain Management I**

- Historical and terminological aspects of the SCM concept
- Motives for the creation of cross-company value creation networks
- Design principles and effects of value creation networks
- Logistical core processes and SCM
- Information technology aspects of the SCM concept
- Coordination and collaboration of the network partners
- Industry-specific solutions of the SCM

#### **Supply Chain Management II**

- Strategic aspects of SCM
- SCM Practice: Tasks and Activities in the Core Planning Process
- SCM Practice: Tasks and Activities in the Core Process of Procurement
- SCM Practice: Tasks and Activities in the Core Process Production
- SCM Practice: Tasks and Activities in the Core Distribution Process



**Learning Outcomes****Supply Chain Management I**

On successful completion, students will be able to

- explain the importance of cross-company value creation processes.
- understand common concepts for modeling cross-company value creation processes.
- understand dynamic effects in supply chains and can systematize their causes and effects.
- explain important theoretical concepts for describing the characteristics and challenges of cross-company value creation processes.
- explain the approaches and problem categories commonly used in the context of supply chain management.
- understand important reference and/or management models for the concretization of supply chain systems.
- name and detail important roles and tasks in the SCM network.
- deal with the coordination problem of SCM and describe the common solution approaches.

**Supply Chain Management II**

On successful completion, students will be able to

- systematically explain the strategic relevance of enterprise-wide value creation processes.
- understand the most important tasks and problems in the SCM core process planning.
- systematize the elements and interrelationships in the CPFR model in a differentiated way.
- be familiar with the characteristics and peculiarities of contract logistics.
- understand the most important tasks and problems in the SCM core process procurement.
- explain central elements and characteristics of a procurement strategy.
- understand the most important tasks and problems in the SCM core process production.
- explain central elements and characteristics of a modern production strategy.
- understand the most important tasks and problems in the SCM core process distribution.
- explain central elements and characteristics of the so-called ECR concept.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Logistics & Transportation

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Transport & Logistics fields

# Supply Chain Management I

Course Code: DLBDESESCM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

SCM proves to be an extremely multi-faceted construct from both a theoretical and a practical point of view. An adequate understanding of the problem dimensions and modes of action of (global) cross-company value creation networks requires a multidimensional approach. It starts by considering logistical processes, with modern process, flow, and network standards forming an important basis for SCM. On the basis of such an approach, students should gain a fundamental understanding of SCM. From the point of view of a holistic approach, it also makes sense to also examine a number of other typical problem areas in addition to the logistical challenges of this concept. This includes IT aspects of SCM (e.g., APS systems), and questions to do with the collaboration and coordination of network partners. This course also considers selected industry specific SCM solutions (ECR or VMI).

## Course Outcomes

On successful completion, students will be able to

- explain the importance of cross-company value creation processes.
- understand common concepts for modeling cross-company value creation processes.
- understand dynamic effects in supply chains and can systematize their causes and effects.
- explain important theoretical concepts for describing the characteristics and challenges of cross-company value creation processes.
- explain the approaches and problem categories commonly used in the context of supply chain management.
- understand important reference and/or management models for the concretization of supply chain systems.
- name and detail important roles and tasks in the SCM network.
- deal with the coordination problem of SCM and describe the common solution approaches.

## Contents

1. Fundamentals of the Supply Chain Concept
  - 1.1 Terminological and Conceptual Fundamentals
  - 1.2 Supply Chain Typology According to Otto
  - 1.3 Supply Chain Typology According to Bechtel/Jayaram
  - 1.4 Dynamic Aspects of Supply Chains

2. Selected Theoretical Concepts for the Supply Chain Concept
  - 2.1 New Institutional Economics
  - 2.2 Game Theory
  - 2.3 Network Approach
  - 2.4 Other Theoretical Additions
3. Supply Chain Management
  - 3.1 Basic Information on the Goals and Scope of SCM
  - 3.2 Popular Problem Areas of the SCM
  - 3.3 Supply Chain Management as an Evolutionary Step in Logistics
  - 3.4 Supply Chain Management as Cooperation Management
4. SCM Model
  - 4.1 Basic Information on the Term SCM Models
  - 4.2 SCOR Model
  - 4.3 SCM Task Model
5. SCM as a Coordination Problem
  - 5.1 Basic Information on the Concept of Coordination
  - 5.2 Coordination Concepts, Context, and Perspectives of SCM
  - 5.3 Coordination Instruments

**Literature****Compulsory Reading****Further Reading**

- Arndt, H. (2018): Supply Chain Management. Optimierung logistischer Prozesse. 7. Auflage, Gabler, Wiesbaden.
- Grosche, P. (2012): Konfiguration und Koordination von Wertschöpfungsaktivitäten in internationalen Unternehmen. Eine empirische Untersuchung in der Automobilindustrie. Gabler-Verlag, Wiesbaden.
- Heiserich, O.E./Helbig, K./Ullmann, W. (2011): Logistik. Eine praxisorientierte Einführung. 4. Auflage, Gabler-Verlag | Springer Fachmedien, Wiesbaden 2011.
- Hertel, J./Zentes, J./Schramm-Klein, H. (2011): Supply-Chain-Management und Warenwirtschaftssysteme im Handel. 2. Auflage, Springer Verlag, Heidelberg.
- Hungenberg, H. (2014): Strategisches Management in Unternehmen. Ziele-Prozesse-Verfahren. 8. Auflage, Wiesbaden.
- Pfohl, H. C. (2010): Logistiksysteme. Betriebswirtschaftliche Grundlagen. 8 Auflage, Springer, Berlin.
- Schulte, C. (2013): Logistik. Wege zur Optimierung der Supply Chain. 6. Auflage, Vahlen, München.
- Werner, H. (2013): Supply Chain Management. Grundlagen, Strategien, Instrumente und Controlling. 5. Auflage, Gabler, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## Supply Chain Management II

Course Code: DLBDESESCM02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

From the perspective of strategic management research and practice, the activities covered by the term SCM are closely related to efforts to build and/or maintain a stable operational competitive advantage. A fundamental discussion of this relationship forms the starting point for the course. On this basis, a differentiated analysis of strategy-relevant activities and instruments in the Plan, Source, Make, Deliver, and Return process categories is then carried out using the SCOR model. Special attention is given to the practice-relevant areas of SCM, e.g., order-promising (plan), supplier-relation-management (source), postponement (make), and the ECR-concept (deliver).

### Course Outcomes

On successful completion, students will be able to

- systematically explain the strategic relevance of enterprise-wide value creation processes.
- understand the most important tasks and problems in the SCM core process planning.
- systematize the elements and interrelationships in the CPFR model in a differentiated way.
- be familiar with the characteristics and peculiarities of contract logistics.
- understand the most important tasks and problems in the SCM core process procurement.
- explain central elements and characteristics of a procurement strategy.
- understand the most important tasks and problems in the SCM core process production.
- explain central elements and characteristics of a modern production strategy.
- understand the most important tasks and problems in the SCM core process distribution.
- explain central elements and characteristics of the so-called ECR concept.

### Contents

1. Strategic Aspects of SCM
  - 1.1 Strategic Thinking and Action: General Information
  - 1.2 Competition Focus and SCM
  - 1.3 Competition Location and SCM
  - 1.4 Competition Rules and SCM

2. SCM Practice: Core Process Planning
  - 2.1 General Preliminary Considerations
  - 2.2 Collaborative Planning, Forecasting, and Replenishment
  - 2.3 Order Promoting
  - 2.4 Kanban
  - 2.5 Integration of X-PL Logistics Service Providers
3. SCM Practice: Core Process Procurement
  - 3.1 General Preliminary Considerations
  - 3.2 Production Synchronous Procurement
  - 3.3 Sourcing Concepts
  - 3.4 Supplier Relations Management
4. SCM Practice: Core Process Production
  - 4.1 Selected Aspects of the Problem Background
  - 4.2 Collaborative Engineering
  - 4.3 Postponement Strategies
  - 4.4 Value Added Partnership
5. SCM Practice: Core Process Distribution
  - 5.1 Basic Information on the Distribution Problem
  - 5.2 Efficient Consumer Response (ECR)
  - 5.3 Consignment Warehouse

**Literature****Compulsory Reading****Further Reading**

- Arndt, H. (2018): Supply Chain Management. Optimierung logistischer Prozesse. 7. Auflage, Gabler, Wiesbaden.
- Grosche, P. (2012): Konfiguration und Koordination von Wertschöpfungsaktivitäten in internationalen Unternehmen. Eine empirische Untersuchung in der Automobilindustrie. Gabler-Verlag, Wiesbaden.
- Heiserich, O.E./Helbig, K./Ullmann, W. (2011): Logistik. Eine praxisorientierte Einführung. 4. Auflage, Gabler-Verlag | Springer Fachmedien, Wiesbaden 2011.
- Hertel, J./Zentes, J./Schramm-Klein, H. (2011): Supply-Chain-Management und Warenwirtschaftssysteme im Handel. 2. Auflage, Springer Verlag, Heidelberg.
- Hungenberg, H. (2014): Strategisches Management in Unternehmen. Ziele-Prozesse-Verfahren. 8. Auflage, Wiesbaden.
- Pfohl, H. C. (2010): Logistiksysteme. Betriebswirtschaftliche Grundlagen. 8 Auflage, Springer, Berlin.
- Schulte, C. (2013): Logistik. Wege zur Optimierung der Supply Chain. 6. Auflage, Vahlen, München.
- Werner, H. (2013): Supply Chain Management. Grundlagen, Strategien, Instrumente und Controlling. 5. Auflage, Gabler, Wiesbaden.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLBDESCM02

## Financial Services Management

Module Code: DLBDSEFSM

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Financial Services Management I) / N.N. (Financial Services Management II)

### Contributing Courses to Module

- Financial Services Management I (DLBDSEFSM01)
- Financial Services Management II (DLBDSEFSM02)

### Module Exam Type

#### Module Exam

#### Split Exam

Financial Services Management I

- Study Format "Distance Learning": Module Exam (50)

Financial Services Management II

- Study Format "Distance Learning": Module Exam (50)

### Weight of Module

see curriculum

**Module Contents****Financial Services Management I**

- Financial Markets and Financial Intermediaries
- Financial Intermediation in Germany
- Financial Services
- Debt Financing Through Financial Intermediaries
- Equity Financing Through Financial Intermediaries

**Financial Services Management II**

- Fundamentals of the Monetary and Asset Situation
- Investment in Money
- Investment in Tangible Assets
- Investment Funds and Certificates
- Insurance Financial Services

**Learning Outcomes****Financial Services Management I**

On successful completion, students will be able to

- know the role of a financial service provider as a financier as well as how individual markets function in the financing sector.
- understand the basic relationships between the different financial services and their (supervisory) legal frameworks.
- evaluate the potential influence of the financial services sector on the real economy.
- familiarize themselves with the financing services offered both for external financing and for self-financing.
- assess the importance of financial services in the form of debt and equity financing in the short, medium, and long term.

**Financial Services Management II**

On successful completion, students will be able to

- systematize the different possibilities for the investment of financial surpluses.
- with the help of knowledge gained regarding conflicts involved in making financial investments, apply different aspects of investment decision-making to financial instruments.
- assess the various forms of investment in order of their safety.
- analyze the various forms of investment in terms of risk and return.
- understand that investment funds, certificates, and derivatives are modern products of financial service providers, which bring high returns and sometimes high risk.

**Links to other Modules within the Study Program**

This module is similar to other modules in the fields of Finance & Tax Accounting

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the Business & Management fields

# Financial Services Management I

Course Code: DLBDSEFSM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The course explains the origin and constitution of the financial market. As a result of the imperfection of the financial market, the necessity of financial intermediaries is theoretically derived, which leads to the thesis of disintermediation. Since the German financial market is determined by regulations and supervision, the legal framework is discussed. The financial services of banks and other specialized financial intermediaries are presented. The main forms of debt financing through financial intermediaries are presented as well as financing with equity capital.

## Course Outcomes

On successful completion, students will be able to

- know the role of a financial service provider as a financier as well as how individual markets function in the financing sector.
- understand the basic relationships between the different financial services and their (supervisory) legal frameworks.
- evaluate the potential influence of the financial services sector on the real economy.
- familiarize themselves with the financing services offered both for external financing and for self-financing.
- assess the importance of financial services in the form of debt and equity financing in the short, medium, and long term.

## Contents

1. Financial Markets and Financial Intermediaries
  - 1.1 Origin and Basic Problems of the Financial Market
  - 1.2 Appearances and Functions of Financial Intermediaries
  - 1.3 The Thesis of Disintermediation in Finance
2. Financial Intermediation in Germany
  - 2.1 The Banking System in Germany
  - 2.2 Capital Management Companies and Insurance Companies
  - 2.3 Regulations and Supervision

3. Financial Services
  - 3.1 Financing Needs
  - 3.2 The Range of Financial Services
  - 3.3 Lending and Collateralization
4. Debt Financing Through Financial Intermediaries
  - 4.1 Short-Term Loans as a Financing Service
  - 4.2 Medium and Long-Term Loans as Financial Services
  - 4.3 Credit Substitutes
5. Equity Financing Through Financial Intermediaries
  - 5.1 Equity Financing Through Capital Participation and Venture Financing Companies
  - 5.2 Services in Connection With Issue Financing

**Literature****Compulsory Reading****Further Reading**

- Bitz, M./Stark, G. (2008): Finanzdienstleistungen. 8. Auflage, Oldenbourg, München/Wien.
- Brealey, R. A./Myers, S. C. (2010): Principles of Corporate Finance. 10. Auflage, McGraw-Hill, London.
- Copeland, T. E./Weston, J. F./Shastri, K. (2008): Finanzierungstheorie und Unternehmenspolitik. 4. Auflage, Pearson, München.
- Hartmann-Wendels, T./Pfungsten, A./Weber, M. (2006): Bankbetriebslehre. 4. Auflage, Springer, Berlin.
- Perridon, L./Steiner, M./Rathgeber, A. W. (2009): Finanzwirtschaft der Unternehmung. 15. Auflage, Vahlen, München.
- Wöhe, G. et al. (2009): Grundzüge der Unternehmensfinanzierung. 10. Auflage, Vahlen, München.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Financial Services Management II

Course Code: DLBDSEFSM02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

### Course Description

In this course, the different possibilities of investing financial surpluses are systematized. The conflicting relationship between the risks, returns, and liquidity of a financial investment are presented, and the different aspects of decision-making for investment in one of the financial instruments are shown. The various forms of investment (monetary values, tangible assets) are presented in the order of their security. The functions that insurance companies perform as financial service providers complete the picture. The different forms of life insurance and their role in old-age provision are presented.

### Course Outcomes

On successful completion, students will be able to

- systematize the different possibilities for the investment of financial surpluses.
- with the help of knowledge gained regarding conflicts involved in making financial investments, apply different aspects of investment decision-making to financial instruments.
- assess the various forms of investment in order of their safety.
- analyze the various forms of investment in terms of risk and return.
- understand that investment funds, certificates, and derivatives are modern products of financial service providers, which bring high returns and sometimes high risk.

### Contents

1. Basic Information on Investing Money and Assets
  - 1.1 Basic Concepts of Money and Asset Investment
  - 1.2 Framework Conditions for Decisions on Plants
  - 1.3 Investment Products
2. Investment in Money
  - 2.1 Investment in Accounts
  - 2.2 Savings Bonds
  - 2.3 Fixed-Interest Securities



3. Investment in Tangible Assets
  - 3.1 Shares
  - 3.2 Stock Exchange Trading
  - 3.3 Investment in Real Estate
4. Investment Funds and Certificates
  - 4.1 Mutual Funds
  - 4.2 Fund of Funds and Hedge Funds
  - 4.3 Derivatives
5. Insurance Financial Services
  - 5.1 Fundamentals of the Insurance Industry
  - 5.2 The Life Insurances

#### Literature

#### Compulsory Reading

#### Further Reading

- Bitz, M./Stark, G. (2008): Finanzdienstleistungen. 8. Auflage, Oldenbourg, München/Wien.
- Brealey, R. A./Myers, S. C. (2010): Principles of Corporate Finance. 10. Auflage, McGraw-Hill, London.
- Copeland, T. E./Weston, J. F./Shastri, K. (2008): Finanzierungstheorie und Unternehmenspolitik. 4. Auflage, Pearson, München.
- Hartmann-Wendels, T./Pfungsten, A./Weber, M. (2006): Bankbetriebslehre. 4. Auflage, Springer, Berlin.
- Perridon, L./Steiner, M./Rathgeber, A. W. (2009): Finanzwirtschaft der Unternehmung. 15. Auflage, Vahlen, München.
- Wöhe, G. et al. (2009): Grundzüge der Unternehmensfinanzierung. 10. Auflage, Vahlen, München.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Module Exam

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## IT project and architecture management

Module Code: DLBCSEITPAM

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

N.N. (IT Project Management) / N.N. (IT Architecture Management)

### Contributing Courses to Module

- IT Project Management (DLBCSEITPAM01)
- IT Architecture Management (DLBCSEITPAM02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### IT Project Management

- Study Format "Distance Learning": Exam, 90 Minutes

##### IT Architecture Management

- Study Format "Distance Learning": Exam, 90 Minutes

### Weight of Module

see curriculum

**Module Contents****IT Project Management**

- Basic terms and foundations of IT project management
- Large and small planning techniques
- Techniques for prioritization, cost-estimation, and project controlling
- Techniques for stakeholder, communication, and risk management
- Organization and structure in IT project management
- Schools of thought in IT project management

**IT Architecture Management**

- Basic terms and foundations of IT enterprise architectures management
- IT application portfolio management
- Architecture governance
- Modeling of IT enterprise architectures
- Frameworks using TOGAF as an example
- Reference models and sample catalogues

**Learning Outcomes****IT Project Management**

On successful completion, students will be able to

- explain and differentiate between the basic principles and tasks of IT project management.
- explain the important practical techniques and methods necessary for the implementation of IT project management.
- describe the basic procedural models and explain their advantages and disadvantages as well as their possible applications.
- identify possible project risks on the basis of given practical scenarios and select suitable measures from IT project management in order to minimize them in a targeted manner.

**IT Architecture Management**

On successful completion, students will be able to

- describe and explain the basic principles of IT strategy, governance, and architecture management, differentiating between them.
- explain and differentiate the typical activities of IT architecture management, their interrelationships, and their dependencies.
- explain suitable models of IT architecture management, distinguish between them, and explain their intended purpose.
- explain and describe selected IT architectural frameworks as well as reference models and sample catalogues.

**Links to other Modules within the Study Program**

This module is similar to other modules in the field(s) of Computer Science & Software Development.

**Links to other Study Programs of IUBH**

All Bachelor Programmes in the IT & Technology field(s).

# IT Project Management

Course Code: DLBCSEITPAM01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In this course, typical problems in the management of Software projects are discussed and the methods and techniques used to address challenges conveyed. In addition, standard procedural models for IT project management are explained and their strengths and weaknesses specifically identified.

## Course Outcomes

On successful completion, students will be able to

- explain and differentiate between the basic principles and tasks of IT project management.
- explain the important practical techniques and methods necessary for the implementation of IT project management.
- describe the basic procedural models and explain their advantages and disadvantages as well as their possible applications.
- identify possible project risks on the basis of given practical scenarios and select suitable measures from IT project management in order to minimize them in a targeted manner.

## Contents

1. Basics Terms and Foundations of IT Project Management
  - 1.1 Definition of a Project and Types of IT Projects
  - 1.2 IT Project Lifecycle
  - 1.3 Multi-Project Management – The Project in the Context of the Organization
2. Planning Techniques
  - 2.1 Large-Scale Planning: Milestones, Sub-tasks, and Work Packages
  - 2.2 Large-Scale Planning: Gantt Charts
  - 2.3 Planning and Organization of Work Packages: Kanban Board
3. Prioritization, Estimation of Costs, Project Controlling
  - 3.1 Prioritization
  - 3.2 Estimation of Costs
  - 3.3 Project Controlling

4. Stakeholder, Communication and Risk Management
  - 4.1 Stakeholder Management
  - 4.2 Communication Management
  - 4.3 Risk Management
  
5. Organization and Structure in IT Project Management
  - 5.1 Overview and Levels of Management from PRINCE2
  - 5.2 Management Processes in PRINCE2
  - 5.3 Pragmatic IT Project Management (PITPM)
  - 5.4 Configuration of an IT Project in PITPM
  - 5.5 Management of a project in PITPM
  
6. Schools of Thought in IT Project Management
  - 6.1 Agile Software Development
  - 6.2 Value-Based Software Engineering

**Literature****Compulsory Reading****Further Reading**

- Berkun, S. (2009): Die Kunst des IT-Projektmanagements. 2. Auflage, O'Reilly, Sebastopol, CA.
- DeMarco, T. (2003): Bärenango. Mit Risikomanagement Projekte zum Erfolg führen. Carl Hanser Verlag, München.
- Geirhos, M. (2011): IT-Projektmanagement. Was wirklich funktioniert – und was nicht. Galileo Computing, Bonn.
- Höhn, R./Höppner S. (2008): Das V-Modell XT. Grundlagen, Methodik und Anwendungen. Springer, Berlin/Heidelberg.
- Malik, M. (2006): Führen, Leisten, Leben. Wirksames Management für eine neue Zeit. Campus, Frankfurt a. M.
- Mangold, P. (2009): IT-Projektmanagement kompakt. 3.Auflage, Spektrum.
- Motzel, E./Pannenbäcker, O. (1998): Projektmanagement-Kanon. Der deutsche Zugang zum Project Management Body of Knowledge. TÜV-Verlag, Köln.
- Patzak, G./Rattay, G.: Projektmanagement. Leitfaden zum Management von Projekten, Projektportfolios und projektorientierten Unternehmen. 5. Auflage, Linde Verlag, Wien.
- Phillips, J. (2010): IT Project Management. On Track from Start to Finish. 3. Auflage, McGraw-Hill, New York, NY.
- Pichler, R. (2007): Scrum. Agiles Projektmanagement erfolgreich einsetzen. dpunkt.verlag, Heidelberg.
- Schwalbe, K. (2010): Information Technology Project Management. 6. Auflage, Course Technology, Independence, KY.
- Tiemeyer, E. (2010): Handbuch IT-Projektmanagement. Vorgehensmodelle, Managementinstrumente, Good Practices. Hanser, München.
- Versteegen, G. (2000): Projektmanagement: mit dem Rational Unified Process. Springer, Berlin/Heidelberg.



**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# IT Architecture Management

Course Code: DLBCSEITPAM02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

In addition to concrete IT projects, such as the development of a new IT system or the introduction of standard software, a strategic management system for organizational-wide IT infrastructure – that is, for all IT hardware and software systems – must be used. Strategic management is the responsibility of the IT enterprise architect, who operates IT architecture management. Their task is to strategically align IT infrastructure with an organization's business and IT strategy. This course covers the typical concepts, methods, procedures, and IT models of architecture management.

## Course Outcomes

On successful completion, students will be able to

- describe and explain the basic principles of IT strategy, governance, and architecture management, differentiating between them.
- explain and differentiate the typical activities of IT architecture management, their interrelationships, and their dependencies.
- explain suitable models of IT architecture management, distinguish between them, and explain their intended purpose.
- explain and describe selected IT architectural frameworks as well as reference models and sample catalogues.

## Contents

1. Basic Terms and Foundation for the Management of IT Enterprise Architectures
  - 1.1 IT Enterprise Architecture
  - 1.2 Goals of Enterprise Architecture Management
  - 1.3 Processes in the Management of IT Enterprise Architectures
2. IT Application Portfolio Management
  - 2.1 IT Application Portfolio Management Overview
  - 2.2 Application Manual
  - 2.3 Portfolio Analysis
  - 2.4 Development Planning

3. Architecture Governance
  - 3.1 Organizational Structure
  - 3.2 Policy Development and Enforcement
  - 3.3 Project Support
4. Modeling of IT Enterprise Architectures
  - 4.1 Models in the Context of IT Architecture Management
  - 4.2 Forms of Documentation for Processes and Applications
  - 4.3 Forms of Documentation for Systems and Technologies
5. Frameworks Using the Example of TOGAF
  - 5.1 Fundamentals and Use of IT Architecture Frameworks
  - 5.2 Overview and Categories of EAM Frameworks
  - 5.3 The Open Group Architecture Framework (TOGAF)
6. Reference Models and Sample Catalogues
  - 6.1 Architecture Reference Models
  - 6.2 EAM Design Sample Catalogue

## Literature

### Compulsory Reading

### Further Reading

- Hanschke, I. (2011): Enterprise Architecture Management. Einfach und effektiv. Hanser, München.
- Keller, W. (2012): IT-Unternehmensarchitektur. Von der Geschäftsstrategie zur optimalen IT-Unterstützung. 2. Auflage, dpunkt.verlag, Heidelberg.
- Keuntje, J. H./Barkow, R. (Hrsg.) (2010): Enterprise Architecture. Management in der Praxis. Wandel, Komplexität und IT-Kosten im Unternehmen beherrschen. Symposion Publishing, Ettlingen.
- Ross, J. W./ Weill, P./Robertson, D. C. (2006): Enterprise Architecture as Strategy. Creating a Foundation for Business Execution. Harvard Business Review Press, Boston, MA.
- Schwarzer, B. (2009): Einführung in das Enterprise Architecture Management. Verstehen – Planen – Umsetzen. Books on Demand, Norderstedt.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Psychology of Human Computer Interaction

Module Code: DLBKPSWPMCI\_E

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

## Module Coordinator

N.N. (Experience Psychology) / N.N. (Human Computer Interaction)

## Contributing Courses to Module

- Experience Psychology (DLBUXEP01\_E)
- Human Computer Interaction (DLBUXHCI01\_E)

## Module Exam Type

### Module Exam

### Split Exam

#### Experience Psychology

- Study Format "Distance Learning": Exam, 90 Minutes

#### Human Computer Interaction

- Study Format "Distance Learning": Exam, 90 Minutes

## Weight of Module

see curriculum

### Module Contents

#### Experience Psychology

- Physiological and Psychological Basics of User Experience
- Future Human-Machine Relationships based on Artificial Intelligence
- Emotional Impact of Design
- User Experience regarding Design Aspects

#### Human Computer Interaction

- Basics of Human Information Processing
- Physiological and Psychological Aspects of Human Perception, Cognition and Behavior
- Technical Framework of Human-Computer Interaction
- Trends in Human-Computer Interaction

### Learning Outcomes

#### Experience Psychology

On successful completion, students will be able to

- outline physiological and psychological basics of user experience.
- understand the emotional impact of design and typography and apply them to specific fields.
- apply principles of Emotional Design.
- understand developments in the human-machine relationship based on future technologies such as artificial intelligence.
- understand and apply aspects of user experience design.

#### Human Computer Interaction

On successful completion, students will be able to

- understand the human basics of perception, information processing, cognition, and motor skills in order to apply them for a user-friendly design of user interfaces.
- understand technical frameworks in the design of user interfaces.
- know and analyze current trends in human-computer interaction.

#### Links to other Modules within the Study Program

This module is similar to other modules in the fields Psychology and Computer Science & Software Development

#### Links to other Study Programs of IUBH

All Bachelor Programs in the Social Sciences and IT & Technology fields

# Experience Psychology

Course Code: DLBUXEP01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The aim is to teach students the psychological and physiological principles of humans, which are of great importance for the design of digital products and services. First, an overview of the psychological aspects of user experience is given. In addition to emotions, motives and personality traits, the functions of the brain are also discussed. Furthermore, the course teaches the emotional effect that can be created through the use of images, colors and shapes as well as typography. Principles of Emotional Design are taught. In addition, the effect of future technologies such as artificial intelligence in the human-machine relationship will be discussed. A final focus will be placed on design and its importance for user experience.

## Course Outcomes

On successful completion, students will be able to

- outline physiological and psychological basics of user experience.
- understand the emotional impact of design and typography and apply them to specific fields.
- apply principles of Emotional Design.
- understand developments in the human-machine relationship based on future technologies such as artificial intelligence.
- understand and apply aspects of user experience design.

## Contents

1. Basics and Explanations of Terms
  - 1.1 Explanation of terms
  - 1.2 User Experience over Time
  - 1.3 Interaction of Psychology and Design
2. How "Experience" Works in the Brain
  - 2.1 Anatomy of the Human Brain
  - 2.2 Limbic System
  - 2.3 Main Components of a Nerve Cell
  - 2.4 Brain Research and Marketing Myths

3. Personal Drivers: Emotions, Motives and Personality Traits
  - 3.1 Reward and Avoidance System
  - 3.2 Motives and Goals
  - 3.3 Personality Traits of the Human Being
  - 3.4 Relevance, Credibility and Differentiation
4. Emotional Design: Retrospect and Future
  - 4.1 Different Levels of Emotional Design
  - 4.2 Design Principles of Emotional Design
  - 4.3 Emotional Design and Technology
  - 4.4 Emotion and Artificial Intelligence
  - 4.5 The Future of the Human-Machine Relationship
5. How Design works
  - 5.1 Effect of Images
  - 5.2 Effect of Colors
  - 5.3 Effect of Shapes
6. How typography works
  - 6.1 Basics of Typography
  - 6.2 Effect of Typography
  - 6.3 Target use of Typography
7. Design of User Experience
  - 7.1 From User-Friendliness to Information Experience
  - 7.2 Design of the Flow Experience
  - 7.3 The Role of Aesthetics
  - 7.4 Emotional Inspiration



**Literature****Compulsory Reading****Further Reading**

- Evans, D. C. (2017): *Bottlenecks: Aligning UX Design with User Psychology*. Apress, Springer Science + Business, New York.
- Kahneman, D. (2011): *Thinking, fast and slow*. Penguin Books, London.
- Norman, D. (2013): *The design of everyday things*. Revised and expanded edition. Basic Books, New York.
- Turner, P. (2017): *A Psychology of User Experience*. Human Computer Interaction Series. Springer International Publishing, Cham/Switzerland.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 90 h	<b>Presence</b> 0 h	<b>Tutorial</b> 30 h	<b>Self Test</b> 30 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

# Human Computer Interaction

Course Code: DLBUXHCI01\_E

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		5	none

## Course Description

The objective of this course is to teach students fundamental aspects of interaction between humans and computers. For a user-friendly design of interfaces on computers, machines and devices, a precise knowledge of human abilities and skills is necessary. The main focus of the course is on teaching the basics of human information processing. Special attention is paid to the physiological and psychological aspects of perception, cognition and motor skills. In addition to basics from a human perspective, the technical conditions for the machine perspective will be introduced. Finally, trends in human-computer interaction will be discussed.

## Course Outcomes

On successful completion, students will be able to

- understand the human basics of perception, information processing, cognition, and motor skills in order to apply them for a user-friendly design of user interfaces.
- understand technical frameworks in the design of user interfaces.
- know and analyze current trends in human-computer interaction.

## Contents

1. Fundamentals of Human-Computer Interaction
  - 1.1 Definitions
  - 1.2 Challenges in Human Computer Interaction
  - 1.3 Basic Models of Human Information Processing
2. Perception
  - 2.1 Sight and Visual Perception
  - 2.2 „Gestaltpsychology“ laws
  - 2.3 Attentive and Preattentive Perception
  - 2.4 Auditory Sense and Auditory Perception
  - 2.5 Sense of Touch and Proprioception
  - 2.6 Smell and Taste Perception

3. Cognition, Motor Skills
  - 3.1 Memory Types and Cognitive Processes
  - 3.2 Stress due to Multiple Tasks
  - 3.3 Measuring Cognitive Load
  - 3.4 Decision Making and Speed
  - 3.5 Motor Skills
4. Mental Models and Errors
  - 4.1 Mental Models
  - 4.2 User Error
  - 4.3 Basic Types of Errors
  - 4.4 Murphy's Law
5. Technical Framework
  - 5.1 Visual Representation and Spatial Resolution
  - 5.2 Time Resolution
  - 5.3 Representation of Color and Brightness
  - 5.4 Acoustic Representation
  - 5.5 Moore's Law
6. Aspects of the Interaction with Socio-Technical systems
  - 6.1 Overview of Interaction Styles
  - 6.2 Acceptance
  - 6.3 Trust
  - 6.4 Security and Data Protection
7. Trends in Human-Computer Interaction
  - 7.1 Intelligent Systems
  - 7.2 Ubiquitous Computing
  - 7.3 Augmented Reality
  - 7.4 Multimodal Interaction
  - 7.5 Haptics

**Literature****Compulsory Reading****Further Reading**

- Sharp, H./Preece, J./Rogers, Y. (2019): Interaction Design: Beyond Human-Computer Interaction. 5. Auflage, John Wiley & Sons, Indianapolis.
- Shneiderman, B./Plaisant, C./Cohen, M./Jacobs, S./Elmqvist, N./Diakopoulos, N. (2017): Designing the User Interface: Strategies for Effective Human-Computer Interaction. 6. Auflage, Pearson, Harlow.
- Stanton, N./Salmon, P.M./Rafferty, L.A./Walker, F.H./Baber, Ch./Jenkins, D.P. (2017): Human Factors Methods: A Practical Guide for Engineering and Design. 2. Auflage, CRC Press Taylor & Francis Group, Boca Raton

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> yes <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 90 Minutes

<b>Student Workload</b>					
<b>Self Study</b>	<b>Presence</b>	<b>Tutorial</b>	<b>Self Test</b>	<b>Practical Experience</b>	<b>Hours Total</b>
90 h	0 h	30 h	30 h	0 h	150 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input checked="" type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input checked="" type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input checked="" type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input checked="" type="checkbox"/> Live Tutorium/Course Feed

## Foreign Language Italian

Module Code: DLFLI

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Foreign Language Italian)

### Contributing Courses to Module

- Foreign Language Italian (DLFLI01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 180 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Depending on the CEFR classification, students are qualified to
  - understand and use familiar everyday expressions and very simple sentences aimed at satisfying concrete needs. They can introduce themselves and others and ask other people questions about themselves – e.g. where they live, who they know, or what things they have – and answer questions of this kind. They can communicate in a simple way if the other party speaks slowly and clearly and is willing to help. (Level A1)\*\*
  - understand sentences and frequently used expressions related to areas of most immediate relevance (e.g., personal and family information, shopping, work, and local area). They can communicate in simple, routine situations that involve a simple and direct exchange of information about familiar and common things. They can use simple language to describe their own background and education, their immediate environment, and things related to immediate needs. (Level A2)\*\*
  - understand the main points when clear standard language is used and when it comes to familiar matters from work, school, and leisure, etc. They can cope with most situations encountered when traveling in an area where the language is spoken. They can express themselves simply and coherently on familiar topics and personal areas of interest. They can report on experiences and events, describe dreams, hopes and goals, and give brief reasons or explanations for their plans and views. (Level B1) \*\*
  - understand the main contents of complex texts on concrete and abstract topics and, in their own field, also technical discussions. They can communicate so spontaneously and fluently that a normal conversation with native speakers is possible without much effort on both sides. They can express themselves clearly and in detail on a wide range of topics, explain a point of view on a topical issue, and indicate the advantages and disadvantages of different options. (Level B2) \*\*
  - understand a wide range of demanding, longer texts and grasp implicit meanings. They can express themselves spontaneously and fluently without often having to search for words. They can use the language effectively and flexibly in social and professional life or in training and studies. They can express themselves in a clear, structured, and detailed manner on complex issues, using various means of text linking appropriately. (Level C1)\*\*\*
- Grammar:
  - Level A1 – includes present and past tenses, sentence construction, and prepositions, etc.
  - Level A2 – includes historical tenses, differences in times of the past, imperative, subordinate clauses, and pronouns (dative, accusative)
  - Level B1 - among others, an introduction of the pluperfect, conjunctions, the passive, adverbs, adjectives (difference), and the future tense
  - Level B2 - includes verb constructions, conditional sentences, and indirect speech, etc.
  - Level C1 - Exercises to consolidate and repeat what has been learned
- \*\*Source:  
[http://www.coe.int/t/dg4/linguistic/Cadre1\\_en.asp](http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp)  
 and  
[http://www.coe.int/t/dg4/linguistic/Source/Framework\\_EN.pdf](http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf)
- \*\*\* Source:  
<http://www.goethe.de/z/50/commeuro/303.htm>



**Learning Outcomes****Foreign Language Italian**

On successful completion, students will be able to

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Languages

**Links to other Study Programs of IUBH**

All Distance Learning Bachelor Programmes

## Foreign Language Italian

Course Code: DLFLI01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		10	none

### Course Description

The qualification goals correspond to level A1-C1 according to the criteria of the Common European Framework of Reference for Languages (CEFR).A1-A2: The basic use of Italian as a foreign language is taught and practiced on the basis of everyday topics and basic grammatical structures.B1: With an expansion of grammatical knowledge and skills and the development of vocabulary in fields such as everyday working life, culture, business, and current events, the independent use of Italian as a foreign language is taught and practiced.B2: The independent use of Italian as a foreign language is taught and practiced by broadening and deepening previous grammatical knowledge and skills and expanding vocabulary in fields such as everyday work, culture, business, professional specializations, and current events.C1: The independent use of the foreign language Italian is taught and practiced with an extension and deepening of the previous grammatical knowledge and skills and the expansion of the vocabulary in fields such as everyday working life, culture, economics, professional specializations, and current events.Course Objectives and Outcome:Course Objectives and Outcome:A1-A2: Upon successful completion of the course, students can use Italian in everyday situations at level A1-A2 CEFR.B1: Upon successful completion of the course, students can use Italian in everyday situations at B1 CEFR level. Starting at this level, students are able to develop their language skills independently through application and further self-study.B2: Upon successful completion of the course, students will be able to independently use Italian at the B2 CEFR level in most daily and professional situations. They are able to express themselves on a wide range of topics, understand specialist discussions in their own specialist field, and communicate spontaneously and fluently so that a normal conversation with native speakers is possible without great effort. Starting from this level, the students can further develop their language skills with further self-study. C1: Upon successful completion of the course, students will be able to express themselves fluently and spontaneously without often having to search for words. They can use the language effectively and flexibly in social and professional life or in training and studies. Students can express themselves in a clear, structured, and detailed way on complex subjects, using various means of text linking appropriately. Starting from this level, the students can further develop their language skills in application and with further self-study.Course Content:The students are able to:Themes: Family (description and introduction of themselves, description and introduction of friends, colleagues and acquaintances); Living (living situation, places of residence); Leisure (shopping, hobbies, traveling, forms of travel, and recreation); Telephoning, reservations, confirmation of orders, feedback; Communication: "Small talk", meetings; Description of their living situation (living, work, and leisure)Grammar: includes past and present tense, sentence construction, and prepositions, etc.Contents of the course A2:The students are able to:Themes everyday life, work, education, studies; work situation, fields of work, places of work, professional goals; personality, description of characteristics; making appointments and agreements; communication: "small talk", talks about places of work, fields of work; description of work situationGrammar: includes imperfect and perfect tenses, the subjunctive, modal verbs, and syntaxContents of the course B1:The students are able to:Thematic: environment: description of places and countries (location, people, places of interest, and special features, etc.); events in business, culture, and politics of immediate importance; use of the foreign language in everyday professional situations; writing: coherent description of places, situations, experiences, recommendations; communication: dialogues, short lecturesGrammar: Training and extension of the applicable sentence tree possibilities (including the subjunctive in various tenses, imperatives, modal verbs, and relative clauses, etc.)Contents of the course B2:The students are able to:Themes: the work day, distribution, sales, communication, human resources, career, solutions for private and business tasksGrammar: includes verb constructions, conditional sentences, and indirect speech, etc.Contents of the course C1:The students are able to:Themes: describe complex issues in detail, link topics with each other, paying special attention to certain aspects, and giving an appropriate conclusionGrammar: includes verb constructions, conditional

**Course Outcomes**

On successful completion, students will be able to

**Contents**

**Literature**

**Compulsory Reading**

**Further Reading**

- according to the online course Rosetta Stone

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b>
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 180 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 180 h	<b>Presence</b> 0 h	<b>Tutorial</b> 60 h	<b>Self Test</b> 60 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 300 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLFLI01

## Foreign Language French

Module Code: DLFLF

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N (Foreign Language French)

### Contributing Courses to Module

- Foreign Language French (DLFLF01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 180 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Depending on the CEFR classification, students are qualified to
  - understand and use familiar everyday expressions and very simple sentences aimed at satisfying concrete needs. They can introduce themselves and others and ask other people questions about themselves – e.g., where they live, who they know, or what things they have – and answer questions of this kind. They can communicate in a simple way if the other party speaks slowly and clearly and is willing to help. (Level A1)\*\*
  - understand sentences and frequently used expressions related to areas of most immediate relevance (e.g., personal and family information, shopping, work, and their local area). They can communicate in simple, routine situations that involve a simple and direct exchange of information about familiar and common things. They can use simple language to describe their own background and education, their immediate environment, and things related to their immediate needs. (level A2)\*\*
  - understand the main points when clear standard language is used and when it comes to familiar matters about work, school, and leisure, etc. They can cope with most situations encountered when traveling in an area where the language is spoken. They can express themselves simply and coherently on familiar topics and personal areas of interest. They can report on experiences and events, describe dreams, hopes and goals, and give brief reasons or explanations for their plans and views. (level B1) \*\*
  - understand the main contents of complex texts on concrete and abstract topics and, in their own field, also technical discussions. They can communicate spontaneously and fluently so that a normal conversation with native speakers is possible without much effort. They can express themselves clearly and in detail on a wide range of topics, explain a point of view on a topical issue, and indicate the advantages and disadvantages of different options. (level B2) \*\*
  - understand a wide range of demanding, longer texts and also grasp implicit meanings. They can express themselves spontaneously and fluently without often having to search for words. They can use the language effectively and flexibly in social and professional life or in training and studies. They can express themselves in a clear, structured, and detailed manner on complex issues, using various means of text linking appropriately. (level C1)\*\*\*
- Grammar:
  - Level A1 – includes present and past tenses, sentence construction, and prepositions, etc.
  - Level A2 – includes historical tenses, differences in times of the past, imperative, subordinate clauses, and pronouns (dative, accusative)
  - Level B1 – Among others, an introduction of the pluperfect, conjunctions, the passive, adverbs, adjectives (difference), and the future tense
  - Level B2 – Includes verb constructions, conditional sentences, and indirect speech, etc.
  - Level C1 – Exercises to consolidate and repeat what has been learned
- \*\*Source  
[http://www.coe.int/t/dg4/linguistic/Cadre1\\_en.asp](http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp)  
 and  
[http://www.coe.int/t/dg4/linguistic/Source/Framework\\_EN.pdf](http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf)
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<b>Learning Outcomes</b> <b>Foreign Language French</b> On successful completion, students will be able to	
<b>Links to other Modules within the Study Program</b> This module is similar to other modules in the field of Languages	<b>Links to other Study Programs of IUBH</b> All Distance Learning Bachelor Programmes

## Foreign Language French

Course Code: DLFLF01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		10	none

### Course Description

The qualification goals correspond to levels A1 through C1, according to the criteria of the Common European Framework of Reference for Languages (CEFR).

**A1/A2:** The basics of French as a foreign language are taught and practiced using everyday topics and simple grammatical structures.

**B1:** Independent use of French as a foreign language is taught, expanding the learner's grammatical knowledge and skills and developing their vocabulary in areas such as everyday working life, culture, business, and current events.

**B2:** Independent use of French as a foreign language is taught and practiced by broadening and deepening previous grammatical knowledge and skills and expanding vocabulary in areas such as everyday work, culture, business, professional specializations, and current events.

**C1:** Independent use of French as a foreign language is taught and practiced with a focus on extending and deepening previous grammatical knowledge and skills and expanding vocabulary in areas such as everyday working life, culture, economics, professional specializations, and current events.

**Course Objectives and Outcome:**

**A1/A2:** Upon successful completion of the course, students can use French in everyday situations at level A1/A2 CEFR.

**B1:** Upon successful completion of the course, students can use French in everyday situations at level B1 CEFR. Starting at this level, students are able to develop their language skills independently through application and further self-study.

**B2:** Upon successful completion of the course, students will be able to independently use French at the level B2 CEFR in most professional situations. They are able to express themselves on a wide range of topics, understand specialist discussions in their own specialist field, and communicate spontaneously and fluently so that a normal conversation with native speakers is possible without great effort. Starting from this level, students can further develop their language skills in application and with further self-study.

**C1:** Upon successful completion of the course, students will be able to express themselves fluently and spontaneously without often having to search for words. They can use the language effectively and flexibly in social and professional life or in training and studies. Students can express themselves in a clear, structured, and detailed way on complex subjects, using various means of text linking appropriately. Starting from this level, the students can further develop their language skills in application and with further self-study.

**Course Content:**

The students are able to:

**Themes:** Family (description and introduction of themselves, description and introduction of friends, colleagues, and acquaintances); Living (living situation and places of residence); Leisure (shopping, hobbies, traveling, forms of travel, and recreation); Telephoning, reservations, confirmation of orders, and feedback; Communication: "Small talk", meetings; Description of life situation (living, work, and leisure)

**Grammar:** Includes present and past tense, sentence construction, and prepositions, etc.

**Contents of the course A2:**

The students are able to:

**Themes:** everyday life, work, education, studies; work situation, fields of work, places of work, professional goals; personality, description of characteristics; making appointments and agreements; communication: "small talk", talks about places of work, fields of work; description of their work.

**Grammar:** among other things, the imperfect and subjunctive tenses, modal verbs, and sentence construction

**Contents of the course B1:**

The students are able to:

**Themes:** environment: description of places and countries (location, people, places of interest, and special features, etc.); events in business, culture, and politics of immediate importance; use of the foreign language in everyday professional situations; writing: coherent description of places, situations, experiences, recommendations; communication: dialogues and short lectures

**Grammar:** Training and extension of the applicable sentence tree possibilities (including the subjunctive in various tenses, the imperative, modal verbs, and relative clauses, etc.)

**Contents of the course B2:**

The students are able to:

**Themes:** working day, distribution, sales, communication, human resources, career, solutions for private and business tasks

**Grammar:** includes verb constructions, conditional sentences, and indirect speech, etc.

**Contents of the course C1:**

The students are able to:

**Themes:** describe complex issues in detail, link topics with each other, paying special attention to certain aspects and giving an appropriate conclusion.

**Grammar:** includes verb constructions, conditional sentences, and

**Course Outcomes**

On successful completion, students will be able to

**Contents**

**Literature**

**Compulsory Reading**

**Further Reading**

- according to the online course Rosetta Stone

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b>
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 180 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 180 h	<b>Presence</b> 0 h	<b>Tutorial</b> 60 h	<b>Self Test</b> 60 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 300 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLFLF01

## Foreign Language Turkish

Module Code: DLFLT

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Foreign Language Turkish)

### Contributing Courses to Module

- Foreign Language Turkish (DLFLT01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 180 Minutes

#### Split Exam

### Weight of Module

see curriculum

<p><b>Module Contents</b></p> <ul style="list-style-type: none"> <li>▪ Depending on the acquired CEFR level, students are enabled to</li> <li>▪ understand and use familiar, everyday expressions and very simple sentences aimed at the fulfilment of fundamental needs. Students can introduce themselves and others, ask and answer questions about themselves and others, such as where they live, people they know and things they own. They can communicate in a simple way if the person they are talking to speaks slowly and clearly and is willing to help. (Level A1) **</li> <li>▪ understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. personal and family information, shopping, work, accustomed settings). Students can communicate in simple, familiar situations involving a basic and direct exchange of information on habitual and predictable issues. They can describe their own background and education, their immediate environment and things related to immediate needs in simple expressions. (Level A2)</li> <li>▪ Grammar:             <ul style="list-style-type: none"> <li>▪ Level A1 - among other things tenses of the present and past, sentence structure</li> <li>▪ Level A2 – among other things tenses of the past, differences in past tenses, imperative, subordinate clauses, pronouns</li> </ul> </li> <li>▪ **Source  <a href="http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp">http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp</a>                      and  <a href="http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf">http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf</a> </li> <li>▪ *** Source:  <a href="http://www.goethe.de/z/50/commeuro/303.htm">http://www.goethe.de/z/50/commeuro/303.htm</a> </li> </ul>	
<p><b>Learning Outcomes</b></p> <p><b>Foreign Language Turkish</b></p> <p>On successful completion, students will be able to</p>	
<p><b>Links to other Modules within the Study Program</b></p> <p>This module is similar to other modules in the field of Languages</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All Distance Learning Bachelor Programmes</p>



## Foreign Language Turkish

Course Code: DLFLT01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		10	none

### Course Description

Description of the course: The qualification objectives correspond to levels A1-A2 following the criteria of the Common European Framework of Reference for Languages (CEFR). A1-A2: The elementary use of the foreign language Turkish is taught and practiced on the basis of everyday topics and using elementary grammatical structures. Course objectives: A1-A2: After successful completion of the course, students can use Turkish in everyday situations at the A1 CEFR level. Contents of the course A1: Students are enabled to, Thematic: family (description and introduction of oneself, description and introduction of friends, colleagues and acquaintances); residence (living situation, places of residence); leisure time (shopping, hobbies, travelling, forms of travel, recreation); telephoning, reservations, order confirmation, feedback; communication: "small talk", getting to know each other; description of life situation (living, work, leisure time) Grammar: among other things tenses of the present and past, sentence structure Contents of the course A2: Students are enabled to, Thematic: everyday life, work, training, studies; work situation, fields of work, places of work, professional goals; personality, description of character traits; making appointments and agreements; communication: "small talk", conversations about places of work, fields of work; description of the working environment Grammar: among other things, tenses of the past, sentence structure

### Course Outcomes

On successful completion, students will be able to

### Contents

### Literature

### Compulsory Reading

### Further Reading

- according to information in the online course Rosetta Stone

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Online Lecture
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 180 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 180 h	<b>Presence</b> 0 h	<b>Tutorial</b> 60 h	<b>Self Test</b> 60 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 300 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

## German Language

Module Code: DLSPGLA

<b>Module Type</b> see curriculum	<b>Admission Requirements</b> none	<b>Study Level</b> BA	<b>CP</b> 10	<b>Student Workload</b> 300 h
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<b>Semester / Term</b> see curriculum	<b>Duration</b> Minimum 1 semester	<b>Regularly offered in</b> WiSe/SoSe	<b>Language of Instruction</b> English
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### Module Coordinator

N.N. (Foreign Language: German)

### Contributing Courses to Module

- Foreign Language: German (DLSPGLA01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 180 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

Based on general and the use of basic and advanced grammar structures, the students will learn and practice German as a Foreign Language following a CEFRL assessment test.

**Learning Outcomes**

**Foreign Language: German**

On successful completion, students will be able to

- use German as a Foreign Language on the corresponding CEFR level. The qualifications aimed at correspond to the A1, A2, B1, B2 and C1 levels in accordance with the criteria of the Common European Framework of Reference for Languages (CEFR).

**Links to other Modules within the Study Program**

This module is similar to other modules in the field of Languages

**Links to other Study Programs of IUBH**

All Distance Learning Bachelor Programmes

## Foreign Language: German

Course Code: DLSPGLA01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		10	none

### Course Description

Depending on the chosen CEFR level, the students will be enabled to: \*\*A1 understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Interact in a simple way provided the other person talks slowly and clearly and is prepared to help. A2 understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need. B1 understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Deal with most situations likely to arise whilst travelling in an area where the language is spoken. Produce simple connected text on topics, which are familiar, or of personal interest. Describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans. B2 understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization. Interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options. C1 understand a wide range of sophisticated, longer texts and to grasp implicit meanings. They can express themselves spontaneously and fluently, without having to search for words more clearly. They can use the language effectively and flexibly in their social and professional life or in education and study. They can speak clearly, in a structured manner and in detail about complex issues, using various means of linking text appropriately.\*\*source: [http://www.coe.int/t/dg4/linguistic/Source/Framework\\_EN.pdf](http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf) and <http://www.goethe.de/z/50/commeuro/303.htm>

### Course Outcomes

On successful completion, students will be able to

- use German as a Foreign Language on the corresponding CEFR level. The qualifications aimed at correspond to the A1, A2, B1, B2 and C1 levels in accordance with the criteria of the Common European Framework of Reference for Languages (CEFR).

### Contents

**Literature**

**Compulsory Reading**

**Further Reading**

- Hagner, V./ Schlüter, S. (2013): Im Beruf. Deutsch als Fremd- und Zweitsprache. Hueber Verlag, München.
- Perlmann-Balme, M./ Schwalb, S./ Matussek, Magdalena (2013): Sicher! B2/1. Deutsch als Fremdsprache. Hueber Verlag, München.
- Eismann, Volker (2006): Training berufliche Kommunikation. B2-C1 - Erfolgreich bei Präsentationen. Kursbuch mit CD Taschenbuch. Cornelsen Verlag, Berlin.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b>
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 180 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 180 h	<b>Presence</b> 0 h	<b>Tutorial</b> 60 h	<b>Self Test</b> 60 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 300 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLSPGLA01



## Foreign Language Spanish

Module Code: DLFLS

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

### Module Coordinator

N.N. (Foreign Language Spanish)

### Contributing Courses to Module

- Foreign Language Spanish (DLFLS01)

### Module Exam Type

#### Module Exam

Study Format: Distance Learning  
Exam, 180 Minutes

#### Split Exam

### Weight of Module

see curriculum

### Module Contents

- Depending on the CEFR classification, students will be able to
  - understand and use familiar everyday expressions and very simple sentences aimed at satisfying concrete needs. They can introduce themselves and others and ask other people questions about themselves - e.g., where they live, who they know, or what things they have - and provide answers to these kinds of questions. They can communicate in a simple way if the other party speaks slowly and clearly and is willing to help (Level A1).\*\*
  - understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. personal and family information, shopping, work, and their local area). They can communicate in simple, routine situations that involve a simple and direct exchange of information about familiar and common things. They can use simple language to describe their own background and education, their immediate environment, and things related to their immediate needs (Level A2)\*\*
  - understand the main points when clear standard language is used and when it comes to familiar matters about work, school, leisure, etc. They can cope with most situations encountered when travelling in an area where the language is spoken. They can express themselves simply and coherently on familiar topics and personal areas of interest. They can report on experiences and events, describe dreams, hopes and goals, and give brief reasons or explanations for their plans and views. (Level B1) \*\*
  - understand the main content of complex texts on concrete and abstract topics and, in their own field, also technical discussions. They can communicate spontaneously and fluently so that a normal conversation with native speakers is possible without much mutual effort. They can express themselves clearly and in detail on a wide range of topics, explain a point of view on a topical issue, and indicate the advantages and disadvantages of different options. (Level B2) \*\*
  - understand a wide range of demanding, longer texts and also grasp implicit meanings. They can express themselves spontaneously and fluently without having to search for words. They can use the language effectively and flexibly in social and professional life or in training and studies. They can express themselves in a clear, structured, and detailed manner on complex issues, using various means of text linking appropriately. (level C1)\*\*\*
- Grammar:
  - Level A1 - Includes present and past tenses, sentence construction, and prepositions, etc.
  - Level A2 - Includes historical tenses, differences in times of the past, imperative, subordinate clauses, and pronouns (dative, accusative)
  - Level B1 - Among others, introduces the pluperfect, conjunctions, the passive, adverbs, adjectives (difference), and the future tense
  - Level B2 - Includes verb constructions, conditional sentences, and indirect speech, etc.
  - Level C1 – Includes exercises to consolidate and repeat what has been learned
- \*\*Source  
[http://www.coe.int/t/dg4/linguistic/Cadre1\\_en.asp](http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp)  
 and  
[http://www.coe.int/t/dg4/linguistic/Source/Framework\\_EN.pdf](http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf)
- \*\*\*Source  
<http://www.goethe.de/z/50/commeuro/303.htm>

<b>Learning Outcomes</b> <b>Foreign Language Spanish</b> On successful completion, students will be able to	
<b>Links to other Modules within the Study Program</b> This module is similar to other modules in the field of Languages	<b>Links to other Study Programs of IUBH</b> All Distance Learning Bachelor Programmes

## Foreign Language Spanish

Course Code: DLFLS01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		10	none

### Course Description

Study goals correspond to the language levels A1-C1, as specified in the Common European Framework of Reference for Languages (CEFR).A1-A2: The basic use of Spanish as a foreign language is taught and practiced on the basis of everyday topics and basic grammatical structures.B1: With an expansion of grammatical knowledge and skills and the development of vocabulary in fields such as everyday working life, culture, business and current events, the independent use of Spanish is taught and practiced.B2: The independent use of Spanish is taught and practiced with an extension and deepening of the previous grammatical knowledge and skills and the expansion of the vocabulary in fields such as everyday working life, culture, economics, professional specializations, and current events.C1: The independent use of Spanish is taught and practiced with an extension and deepening of the previous grammatical knowledge and skills and the expansion of the vocabulary in fields such as everyday working life, culture, economics, professional specializations, and current events.Course Objectives and Outcome:Course Objectives and Outcome:A1-A2: Upon successful completion of the course, students can use Spanish in everyday situations at level A1-A2 CEFR.B1: Upon successful completion of the course, students can use Spanish in everyday situations at B1 CEFR level. Starting at this level, students are able to develop their language skills independently through application and further self-study.B2: Upon successful completion of the course, students will be able to independently use Spanish at the B2 CEFR level in most daily and professional situations. They are able to express themselves on a wide range of topics in order to understand specialist discussions in their own specialist field, and to communicate spontaneously and fluently so that a normal conversation with native speakers is possible without great effort being made by either side. Starting from this level, students can further develop their language with further self-study.C1: Upon successful completion of the course, students will be able to express themselves fluently and spontaneously without having to search for words often. They can use the language effectively and flexibly in social and professional life or in training and studies. Students can express themselves in a clear, structured and detailed way on complex subjects, using various means of text linking appropriately. Starting from this level, the students can further develop their language skills with further self-study.Course Content:The students are able to:Themes: Family (description and introduction of themselves, description and introduction of friends, colleagues, and acquaintances); Living (living situation, places of residence); Leisure (shopping, hobbies, travelling, forms of travel, and recreation); Telephoning, reservation, confirmation of order, feedback; Communication: "Small talk", meetings; Description of daily life (living, work, and leisure)Grammar: includes present and past tense, sentence construction, and prepositions, etc.Contents of the course A2:The students are able to:Themes: everyday life, work, education, and studies; work situation, fields of work, places of work, professional goals; personality and description of characteristics; making appointments and agreements; communication: "small talk", talking about places of work, fields of work, describing their work situation.Grammar: includes the perfect and imperfect tenses, the subjunctive, modal verbs, and sentence structureContents of the course B1:The students are able to:Themes: environment: description of places and countries (location, people, places of interest, and special features, etc.); events in business, culture, and politics of immediate importance; use of the foreign language in everyday professional situations; writing: coherent description of places, situations, experiences, recommendations; communication: dialogues and short lectures.Grammar: Training and extension of the applicable sentence tree possibilities (including subjunctive in various tenses, imperative, modal verbs, and relative clauses, etc.)Contents of the course B2:The students are able to:Themes: working day, distribution, sales, communication, human resources, career, solutions for private and business tasksGrammar: includes verb constructions, conditional sentences, and indirect speech, etc.Contents of the course C1:The students are able to:Thematically: describe complex issues in detail, link topics with each other, paying special attention to certain aspects and giving an appropriate conclusionGrammar: including verb

**Course Outcomes**

On successful completion, students will be able to

**Contents**

**Literature**

**Compulsory Reading**

**Further Reading**

- according to the online course Rosetta Stone

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b>
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> no
<b>Type of Exam</b>	Exam, 180 Minutes

<b>Student Workload</b>					
<b>Self Study</b> 180 h	<b>Presence</b> 0 h	<b>Tutorial</b> 60 h	<b>Self Test</b> 60 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 300 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input checked="" type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

DLFLS01



## Bachelor Thesis

Module Code: DLBBT

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	none	BA	10	300 h

Semester / Term	Duration	Regularly offered in	Language of Instruction
see curriculum	Minimum 1 semester	WiSe/SoSe	English

### Module Coordinator

Degree Program Advisor (SGL) (Bachelor Thesis) / Degree Program Advisor (SGL) (Colloquium)

### Contributing Courses to Module

- Bachelor Thesis (DLBBT01)
- Colloquium (DLBBT02)

### Module Exam Type

#### Module Exam

#### Split Exam

##### Bachelor Thesis

- Study Format "Distance Learning": Written Assessment: Bachelor Thesis

##### Colloquium

- Study Format "Distance Learning": Presentation: Colloquium

### Weight of Module

see curriculum

<p><b>Module Contents</b></p> <p><b>Bachelor Thesis</b></p> <ul style="list-style-type: none"> <li>▪ Bachelor's thesis</li> <li>▪ Colloquium on the bachelor's thesis</li> </ul> <p><b>Colloquium</b></p>	
<p><b>Learning Outcomes</b></p> <p><b>Bachelor Thesis</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ work on a problem from their major field of study by applying the specialist and methodological skills they have acquired during their studies.</li> <li>▪ independently analyze selected tasks with scientific methods, critically evaluate them, and develop appropriate solutions under the guidance of an academic supervisor.</li> <li>▪ record and analyze existing (research) literature appropriate to the topic of their bachelor's thesis.</li> <li>▪ prepare a detailed written elaboration in compliance with scientific methods.</li> </ul> <p><b>Colloquium</b></p> <p>On successful completion, students will be able to</p> <ul style="list-style-type: none"> <li>▪ present a problem from their field of study using academic presentation and communication techniques.</li> <li>▪ reflect on the scientific and methodological approach chosen in their bachelor's thesis.</li> <li>▪ demonstrate that they can actively answer subject-related questions from the subject experts (reviewers of the bachelor's thesis).</li> </ul>	
<p><b>Links to other Modules within the Study Program</b></p> <p>All modules in the bachelor program</p>	<p><b>Links to other Study Programs of IUBH</b></p> <p>All bachelor programs in distance learning</p>

# Bachelor Thesis

Course Code: DLBBT01

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		9	none

## Course Description

The aim and purpose of the bachelor's thesis is to successfully apply the subject-specific and methodological competencies acquired during the course of study in the form of an academic dissertation with a thematic reference to the major field of study. The content of the bachelor's thesis can be a practical-empirical or theoretical-scientific problem. Students should prove that they can independently analyze a selected problem with scientific methods, critically evaluate it, and work out proposed solutions under the subject-methodological guidance of an academic supervisor. The topic chosen by the student from their respective field of study should meet the acquired scientific competences, deepening their academic knowledge and skills in order to meet the future needs of the field.

## Course Outcomes

On successful completion, students will be able to

- work on a problem from their major field of study by applying the specialist and methodological skills they have acquired during their studies.
- independently analyze selected tasks with scientific methods, critically evaluate them, and develop appropriate solutions under the guidance of an academic supervisor.
- record and analyze existing (research) literature appropriate to the topic of their bachelor's thesis.
- prepare a detailed written elaboration in compliance with scientific methods.

## Contents

- The bachelor's thesis must be written on a topic that relates to the content of the respective major field of study. In the context of the bachelor's thesis, the problem, as well as the scientific research goal, must be clearly emphasized. The work must reflect the current state of knowledge of the topic to be examined by means of an appropriate literature analysis. The student must prove their ability to use the acquired knowledge theoretically and/or empirically in the form of an independent and problem-solution-oriented application.

**Literature**

**Compulsory Reading**

**Further Reading**

- Hunziker, A.W. (2010): Spaß am wissenschaftlichen Arbeiten. So schreiben Sie eine gute Semester-, Bachelor- oder Masterarbeit. 4. Auflage, Verlag SKV, Zürich.
- Wehrlin, U. (2010): Wissenschaftliches Arbeiten und Schreiben. Leitfaden zur Erstellung von Bachelorarbeit, Masterarbeit und Dissertation – von der Recherche bis zur Buchveröffentlichung. AVM, München.
- Selection of literature according to topic

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Thesis
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> yes
<b>Type of Exam</b>	Written Assessment: Bachelor Thesis

<b>Student Workload</b>					
<b>Self Study</b> 270 h	<b>Presence</b> 0 h	<b>Tutorial</b> 0 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 270 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input checked="" type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed

# Colloquium

Course Code: DLBBT02

Study Level	Language of Instruction	Contact Hours	CP	Admission Requirements
BA	English		1	none

## Course Description

The colloquium will take place after the submission of the bachelor's thesis. This is done at the invitation of the experts. During the colloquium, students must prove that they have independently produced the content and results of the written work. The content of the colloquium is a presentation of the most important work contents and research results by the student as well as the answering of questions by experts.

## Course Outcomes

On successful completion, students will be able to

- present a problem from their field of study using academic presentation and communication techniques.
- reflect on the scientific and methodological approach chosen in their bachelor's thesis.
- demonstrate that they can actively answer subject-related questions from the subject experts (reviewers of the bachelor's thesis).

## Contents

- The colloquium includes a presentation of the most important results of the bachelor's thesis, followed by the student answering the reviewers' technical questions.

## Literature

### Compulsory Reading

### Further Reading

- Renz, K.-C. (2016): Das 1 x 1 der Präsentation. Für Schule, Studium und Beruf. 2. Auflage, Springer Gabler, Wiesbaden.

**Study Format Distance Learning**

<b>Study Format</b> Distance Learning	<b>Course Type</b> Thesis Defense
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<b>Information about the examination</b>	
<b>Examination Admission Requirements</b>	<b>BOLK:</b> no <b>Course Evaluation:</b> yes
<b>Type of Exam</b>	Presentation: Colloquium

<b>Student Workload</b>					
<b>Self Study</b> 30 h	<b>Presence</b> 0 h	<b>Tutorial</b> 0 h	<b>Self Test</b> 0 h	<b>Practical Experience</b> 0 h	<b>Hours Total</b> 30 h

<b>Instructional Methods</b>	
<input type="checkbox"/> Learning Sprints® <input type="checkbox"/> Course Book <input type="checkbox"/> Vodcast <input type="checkbox"/> Shortcast <input type="checkbox"/> Audio <input type="checkbox"/> Exam Template	<input type="checkbox"/> Review Book <input type="checkbox"/> Creative Lab <input type="checkbox"/> Guideline <input type="checkbox"/> Live Tutorium/Course Feed