MODULE HANDBOOK

Bachelor of Science

Bachelor Computer Science (CSE-BACS)

180 CP

Campus Studies

As of April 1st, 2025

INTERNATIONAL
UNIVERSITY OF
APPLIED SCIENCES

Classification: Undergraduate

Contents

Module CSEBCSTCSML: Theoretical Computer Science and Mathematical Logic

Module CSEBDSIPWP: Introduction to Programming with Python

Module CSEBCSSQA: Software Quality Assurance

Module CSEBCSS: Specification

Module CSEBCSPSE: Project: Software Engineering

Module CSEBCSSCTCS: Seminar: Current Topics in Computer Science

Module CSEBCSIDPITS: Introduction to Data Protection and Cyber Security

Module CSEBCSCT-01: Cryptography

Module DLSFPD: Salesforce Platform Development

Module DLBCSEMSE: Mobile Software Engineering

Introduction to Computer Science

Module Code: CSEBCSICS

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Carsten Skerra (Introduction to Computer Science)

Contributing Courses to Module
▪ Introduction to Computer Science (CSEBCSICS01)

Module Exam Type	
Module Exam Study Format: Campus Studies Exam, 90 Minutes	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Information representation
- Algorithms and data structures
- Propositional logic / Boolean algebra
- Hardware
- Networks and the internet
- Software
- Computer science as a discipline

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Learning Outcomes

Introduction to Computer Science

On successful completion, students will be able to

- understand basic algorithms and data structures.
- apply basic constructs of propositional logic in programming.
- describe the structure of computer hardware systems.
- specify the structure and the main services of the internet.
- discuss professional conduct in computer science.

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Links to other Modules within the Study Program

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

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Links to other Study Programs of the University

All Bachelor Programs in the IT & Technology field.

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Introduction to Computer Science

Course Code: CSEBCSICS01

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

Course Description

The goal of this course is to provide an introduction to computer science and its main concepts. It covers basic topics such as information representation and an introduction to algorithms and data structures. Propositional logic and Boolean algebra are also introduced, both of which form an important basis in computer science, e.g., for expressing conditions in programming.Furthermore, the course introduces the three main components of computing infrastructures: hardware, networks, and software. Finally, the course covers the meta level by looking at the role of computer science as a discipline as well as ethics and professional conduct.

Course Outcomes

On successful completion, students will be able to

- understand basic algorithms and data structures.
- apply basic constructs of propositional logic in programming.
- describe the structure of computer hardware systems.
- specify the structure and the main services of the internet.
- discuss professional conduct in computer science.

Contents

1. Basic concepts of data processing
   - 1.1 Data, information and messages
   - 1.2 Software, firmware and hardware
   - 1.3 Languages, syntax and semantics
   - 1.4 Historical overview

2. Information representation
   - 2.1 Number representation formats
   - 2.2 Representation of non-numerical information
   - 2.3 Data types
   - 2.4 Redundancy and error tolerance

3. Algorithms and data structures
   - 3.1 Algorithms and flow diagrams

3.2 Simple data structures
3.3 Searching and sorting
3.4 Quality of algorithms (correctness, termination, efficiency/complexity)

4. Propositional logic, Boolean algebra and circuit design
   4.1 Propositions and logical conclusions
   4.2 Conjunctive and disjunctive normal form
   4.3 Digital circuit design

5. Hardware and computer architectures
   5.1 Computer types and their architecture
   5.2 Processors and memory
   5.3 Input and output
   5.4 Interfaces and drivers
   5.5 High-performance computing

6. Networks and the internet
   6.1 Wired and wireless networks and their topologies
   6.2 The TCP/IP and the ISO/OSI model
   6.3 Internet structure and services
   6.4 The internet of things

7. Software
   7.1 BIOS and operating systems
   7.2 Application software and information systems
   7.3 Apps
   7.4 Embedded systems
   7.5 Software development

8. Computer Science as a discipline
   8.1 The role and sub-disciplines of computer science
   8.2 Artificial intelligence, data science and computer science
   8.3 Ethical aspects of computer science
   8.4 The ACM Code of Ethics and Professional Conduct

Literature
Compulsory Reading
Further Reading ▪ Dale, N., & Lewis, J. (2020). Computer science illuminated (7th ed.). Jones & Bartlett Learning. ▪ Downey, A. B., & Mayfield, C. (2020). Think Java: How to think like a computer scientist. O'Reilly. ▪ Filho, W. F. (2018). Computer science distilled: Learn the art of solving computational problems. Code Energy LLC. ▪ Petzold, C. (2000). Code: The hidden language of computer hardware and software. Microsoft Press. ▪ Whitington, J. (2016). A machine made this book: Ten sketches of computer science. Coherent Press.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Course Book	☑ Practice Exam
☑ Video	☑ Online Tests
☑ Slides	

Introduction to Academic Work for IT and Technology

Module Code: CSEBIAWITT

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Markus Christof Hemmer (Introduction to Academic Work for IT and Technology)
Information about the Module Coordinator without guarantee

Contributing Courses to Module
▪ Introduction to Academic Work for IT and Technology (CSEBIAWITT01)

Module Exam Type	
Module Exam Study Format: Campus Studies Written Assessment: Case Study	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Everyday Knowledge vs. Academic Work
- Academic Work
- Working with Sources and Literature
- Research Design
- Writing an Academic Paper
- Academic Work in IT and Technology in Practice

Learning Outcomes	
Introduction to Academic Work for IT and Technology On successful completion, students will be able to ▪ explain what science is and why science is needed (including in practice-based studies and professional practice). ▪ name and apply theories, methods, and models in IT and technology. ▪ find, analyze, and classify academic literature and types of sources. ▪ prepare academic papers independently.	
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 the University** All Bachelor Programs in the Business field

Introduction to Academic Work for IT and Technology

Course Code: CSEBIAWITT01

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

Course Description

As researchers and students, we do not want to take arguments for true simply because they sound interesting but to get to the bottom of them systematically. For this, we must think scientifically. But what exactly is science? The course teaches the basics of scientific thinking and working and uses concrete examples from IT and technology to show which standards academic papers must meet and how they are structured. Students learn important aspects of academic work, such as handling sources, basic formats for papers in IT and technology, and the methods and techniques necessary to write their academic papers.

Course Outcomes

On successful completion, students will be able to

- explain what science is and why science is needed (including in practice-based studies and professional practice).
- name and apply theories, methods, and models in IT and technology.
- find, analyze, and classify academic literature and types of sources.
- prepare academic papers independently.

Contents

1. Everyday Knowledge vs. Academic Work
   - 1.1 What is True?
   - 1.2 What are Trustworthy Sources?
   - 1.3 Critical Use of Primary and Secondary Sources
   - 1.4 Developing and Arguing Your Point of View
   - 1.5 Aspects of Academic Work

2. Academic Work
   - 2.1 Finding a Topic
   - 2.2 Formats of Academic Works
   - 2.3 Example: The Structure of an Academic Work
   - 2.4 Standards in IT and Technology

3. Working with Sources and Literature

3.1 Acquire Information: Search for, Find, and Evaluate Sources and Literature
3.2 Literature Management
3.3 Reading Academic Texts
3.4 Citation
3.5 Avoiding Plagiarism

4. Research Design
4.1 Important Formats
4.2 Methods: Quantitative or Qualitative?
4.3 Data Collection Methods
4.4 Data Evaluation Methods
4.5 Choosing a Research Design

5. Writing an Academic Paper
5.1 Project Plan and Schedule
5.2 Structure
5.3 Format and Style
5.4 Developing an Academic Argument

6. Academic Work in IT and Technology in Practice
6.1 Becoming a Billionaire Through Research: Brin & Page, 1998
6.2 A Systematic Literature Review: Jansen-Preilowski et al., 2020
6.3 Design Science Research: Kunzmann, 2022

Literature

Compulsory Reading

Further Reading

- Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed., Int. Student Ed.). Sage Publications.
- Hemmer, M. C., & Fröhlich, T. (2023). The art of thesis writing: A comprehensive guide to authoring graduate theses with foundations of research. Hemmer Fröhlich Publishing.
- Paul, J., & Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know? Elsevier Ltd.
- Pears, R., & Shields, G. J. (2022). Cite them right: The essential referencing guide (12th ed.). Bloomsbury Publishing.
- Silvia, P. J. (2019). How to write a lot: A practical guide to productive academic writing (2nd ed.). APA LifeTools.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Case Study

Student Workload					
Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
94 h	36 h	0 h	20 h	0 h	150 h

Mathematics I

Module Code: CSEBCSM1

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Veronica Mas (Mathematics I)

Contributing Courses to Module

- Mathematics I (CSEBCSM101)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- Basic definitions and terms of discrete mathematics
- Sets and propositional logic
- Number systems such as decimal and binary systems
- Graphs and mappings
- Selected topics of elementary number theory
- Cryptography

Learning Outcomes	
Mathematics I On successful completion, students will be able to ▪ understand basic terms of discrete mathematics as well as describe them and distinguish them from each other. ▪ understand concepts of number theory and their application in IT and technology and be able to solve tasks independently by applying these concepts.	
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 the University** All Bachelor Programmes in the Business & Management field.

Mathematics I

Course Code: CSEBCSM101

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

Course Description

Many practical concepts in IT and technology are based on the findings of discrete mathematics. For an in-depth understanding of, for example, data structures, the construction of communication networks, or of solutions to algorithmic problems, a basic understanding of their mathematical background is necessary. This course therefore introduces discrete mathematical terms and concepts, with specific areas of number theory also taught.

Course Outcomes

On successful completion, students will be able to

- understand basic terms of discrete mathematics as well as describe them and distinguish them from each other.
- understand concepts of number theory and their application in IT and technology and be able to solve tasks independently by applying these concepts.

Contents

1. Mathematical Basics
   - 1.1 Basic Concepts
   - 1.2 Proof Techniques
   - 1.3 Finite Sums
2. Sets
   - 2.1 Properties and Calculation Rules for Sets
   - 2.2 Equivalence Relations
3. Propositional Logic
   - 3.1 Statements and Logical Connections
   - 3.2 Truth Tables
   - 3.3 Computational Rules of Propositional Logic
   - 3.4 Simplification of Expressions in Propositional Logic
4. Number Systems
   - 4.1 Decimal System

4.2 Binary System
4.3 Hexadecimal System

5. Mappings
   5.1 Mappings and Graphs
   5.2 Special Properties of Mappings

6. Basic Algebraic Structures
   6.1 Groups
   6.2 Rings
   6.3 Residual Class Rings

7. Prime Numbers
   7.1 Definition and Properties of Prime Numbers
   7.2 Prime Number Test

8. Modular Arithmetic
   8.1 The Euclidean Algorithm
   8.2 Fundamental Theorem of Arithmetic

9. Applications in Cryptography
   9.1 The Shift Cryptosystem
   9.2 Symmetric vs Asymmetric Cryptosystems
   9.3 The RSA Cryptosystem

Literature

Compulsory Reading

Further Reading

▪ Rosenthal, D., Rosenthal, D., Rosenthal, P. (2018). A Readable Introduction to Real Mathematics (2nd ed.). Springer.

Study Format Campus Studies

Study Format	**Course Type**
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Object-oriented Programming with Java

Module Code: CSEBCSOOPJ

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Sebastian Lempert (Object-oriented Programming with Java)

Contributing Courses to Module

- Object-oriented Programming with Java (CSEBCSOOPJ01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- Introduction to the Java language
- Java language constructs
- Introduction to object-oriented system developement
- Inheritance
- Object-oriented concepts
- Exception handling
- Interfaces

Learning Outcomes	
Object-oriented Programming with Java On successful completion, students will be able to ▪ describe the basic concepts of object-oriented modeling and programming, distinguishing them from one another. ▪ describe the basic concepts and elements of the Java programming language and have some experience in their use. ▪ independently create Java programs to solve concrete problems.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Computer Science & Software Development	All Bachelor Programmes in the IT & Technology field

Object-oriented Programming with Java

Course Code: CSEBCSOOPJ01

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

Course Description

Operational information systems are usually planned and programmed to be object-oriented. Therefore, this course teaches the basic skills of object-oriented programming. Theoretical concepts are presented and practiced directly with the programming language Java.

Course Outcomes

On successful completion, students will be able to

- describe the basic concepts of object-oriented modeling and programming, distinguishing them from one another.
- describe the basic concepts and elements of the Java programming language and have some experience in their use.
- independently create Java programs to solve concrete problems.

Contents

1. Introduction to Object-Oriented System Development
   - 1.1 Object Orientation as a Way of Looking at Complex Systems
   - 1.2 The Object as a Basic Concept of Object Orientation
   - 1.3 Phases in the Object-Oriented Development Process
   - 1.4 Basic Principle of Object-Oriented System Development

2. Introduction to Object-Oriented Modeling
   - 2.1 Structuring Problems With Classes
   - 2.2 Identifying Classes
   - 2.3 Attributes as Properties of Classes
   - 2.4 Methods as Functions of Classes
   - 2.5 Associations between Classes
   - 2.6 Unified Modeling Language (UML)

3. Programming Classes in Java
   - 3.1 Introduction to the Java Programming Language
   - 3.2 Basic Elements of a Class in Java
   - 3.3 Attributes in Java

Literature
Compulsory Reading
Further Reading ▪ Freeman, E., Robson, E., Bates, B., & Sierra, K. (2014). Head first design patterns (A brain friendly guide). O'Reilly Media. ▪ Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1995). Design patterns: Elements of re-usable object-oriented software. Addison-Wesley. ▪ Liang, Y. D. (2018). Introduction to Java programming and data structures. Pearson Education. ▪ Liguiori, L. & Liguori, P. (2008). Java pocket guide: Instant help for Java. O'Reilly Media. ▪ Oracle (2017). The Java tutorials. Available online. ▪ Samoylov, N. (2019). Learn Java 12 programming: A step-by-step guide to learning essential concepts in Java SE 10, 11, and 12. Packt Publishing. ▪ Weisfeld M. (2019). The object-oriented thought process (5th ed.). Addison-Wesley.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Data Structures and Java Class Library

Module Code: CSEBCSDSJCL

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Sebastian Lempert (Data Structures and Java Class Library)

Contributing Courses to Module

- Data Structures and Java Class Library (CSEBCSDSJCL01)

Module Exam Type	
Module Exam Study Format: Campus Studies Exam, 90 Minutes	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Programming style
- Working with objects
- External packages and libraries
- Data structures
- Strings and calendar
- File system and data streams

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Learning Outcomes

Data Structures and Java Class Library

On successful completion, students will be able to

- understand typical data structures and distinguish them from each other.
- independently create solutions in the Java programming language using the data structures.
- understand scenarios and strategies for comparing objects and implement them in Java.
- describe the possible uses and functions of character strings and calendar objects in Java and have experience using them.
- describe the possible uses and functions of streams in Java and have experience using them.

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Links to other Modules within the Study Program

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

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Links to other Study Programs of the University

All Bachelor Programmes in the IT & Technology fields

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Data Structures and Java Class Library

Course Code: CSEBCSDSJCL01

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

Course Description

Based on the contents of the course "Basics of object-oriented programming with Java", this course deepens the knowledge of object-oriented programming. In particular, data structures, their use cases, and their implementation in the Java language are considered. In addition, strategies and scenarios of object comparisons, the use of functions of the "String" data type, the use of calendar objects, and the use of streams are taught.

Course Outcomes

On successful completion, students will be able to

- understand typical data structures and distinguish them from each other.
- independently create solutions in the Java programming language using the data structures.
- understand scenarios and strategies for comparing objects and implement them in Java.
- describe the possible uses and functions of character strings and calendar objects in Java and have experience using them.
- describe the possible uses and functions of streams in Java and have experience using them.

Contents

1. Programming Style
   - 1.1 Code Documentation
   - 1.2 Code Annotations
   - 1.3 Code Conventions
2. Working with Objects
   - 2.1 String Representation of Objects
   - 2.2 Compare with ==
   - 2.3 Compare with Equals()
   - 2.4 Compare by HashCode()
   - 2.5 CompareTo()
   - 2.6 Cloning Objects
3. External Packages and Libraries
   - 3.1 Importing Packages

3.2 The Java Class Library

4. Data Structures
   - 4.1 Arrays
   - 4.2 Collections
   - 4.3 Working with Collections
   - 4.4 Lists
   - 4.5 Quantities (Sets)
   - 4.6 Associative Memory (Maps)
   - 4.7 Stacks (Basement)
   - 4.8 Queues (Snakes)

5. Strings and Calendar
   - 5.1 Strings
   - 5.2 StringBuffer
   - 5.3 Splitting Character Strings
   - 5.4 Date and time
   - 5.5 Calendar

6. File System and Data Streams
   - 6.1 Working with the File System
   - 6.2 Working with Files

Literature

Compulsory Reading

Further Reading

- Bloch, J. (2017). Effective Java (3rd ed.). Addison-Wesley.
- Oracle. (2018a). Java platform standard edition 10 API specification. (Available online).
- Oracle. (2018b). String (Java platform SE 10). (Available online).
- Oracle. (2018c). Date (Java platform SE 10). (Available online).
- Oracle. (2018d). java.io (Java platform SE 10). (Available online).
- Oracle. (2019). The Java language specification: Java SE 11 edition. (Available online).
- Seidl, M. (2015). UML@Classroom: An introduction to object-oriented modeling. Springer.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Intercultural and Ethical Decision-Making

Module Code: CSEBCSIDM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Zeljko Sevic (Intercultural and Ethical Decision-Making)

Contributing Courses to Module

- Intercultural and Ethical Decision-Making (CSEBCSIDM01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Written Assessment: Case Study	

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 field of Business Administration & Management	**Links to other Study Programs of the University** All Bachelor Programs in the Business field

Intercultural and Ethical Decision-Making

Course Code: CSEBCSIDM01

Study Level	Language of Instruction and Examination	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 Hofstedes 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

- Al-Ali, E., & Masmoudi, M. (2023). Leadership and Workplace Culture in the Digital Era. Business Science Reference.
- Barmeyer, C., Bausch, M., & Mayrhofer, U. (2021). Constructive Intercultural Management.
- Berrones-Flemmig, N., Contreras, F., & Dornberger, U. (2022). Business in the 21st century: A sustainable approach (1st ed.). Emerald Publishing Limited.
- Rossouw, J., & Van Vuuren, L. (2017). Business ethics (6th ed.). Oxford University Press Southern Africa.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Case Study

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	20 h	0 h	150 h

Mathematics II

Module Code: CSEBCSM2

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

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

Module Coordinator

Dr. Annika Denkert (Mathematics II)

Contributing Courses to Module

- Mathematics II (CSEBCSM201)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- Selected topics of linear algebra
- Selected chapters on graphs and algorithms

Learning Outcomes	
Mathematics II On successful completion, students will be able to ▪ understand basic concepts of linear algebra, their interrelations, and their application in IT and technology and be able solve tasks independently using these concepts. ▪ understand and distinguish the basic concepts and important algorithms for graphs and trees from the field of discrete mathematics as well as their application in IT and technology.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Methods	All Bachelor Programs in the Business & Management field

Mathematics II

Course Code: CSEBCSM201

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

Course Description

This course continues the introduction to topics of discrete mathematics which began in the module "Mathematics Fundamentals I". In this course, the concepts of linear algebra are introduced and knowledge about graphs and algorithms for graphs is deepened. Typical questions of applied computer science are selected, and students are shown how they can be solved with graphs.

Course Outcomes

On successful completion, students will be able to

- understand basic concepts of linear algebra, their interrelations, and their application in IT and technology and be able solve tasks independently using these concepts.
- understand and distinguish the basic concepts and important algorithms for graphs and trees from the field of discrete mathematics as well as their application in IT and technology.

Contents

1. Introduction to Matrices
   - 1.1 Basic Concepts of Matrices
   - 1.2 Addition of Matrices
   - 1.3 Scalar Multiplication and Product
2. Inverting Matrices
   - 2.1 Multiplication of Matrices
   - 2.2 Properties of Matrix Multiplication
   - 2.3 Inverse Matrices
3. Linear Systems of Equations
   - 3.1 Gauss Algorithm
   - 3.2 Example Applications of the Gaussian Algorithm
4. Introduction to Graphs
   - 4.1 Undirected Graphs
   - 4.2 Further Properties of Graphs

	4.3	Adjacency Matrix
5.	The Problem of the Shortest Routes	
	5.1	Directional Graph or Digraph
	5.2	Weighted Graph
	5.3	Dijkstra's Algorithm
6.	The Königsberg Bridge Problem	
	6.1	Routing in Graphs
	6.2	Eulerian Graph
	6.3	Hierholzer's Algorithm
	6.4	The Postman Problem
7.	A City Tour Where Each City is Visited Exactly Once.	
	7.1	Special Graphs
	7.2	Hamiltonian Graph
	7.3	The Ore and Dirac Condition
	7.4	The Problem of the Traveling Salesman
8.	Trees	
	8.1	Properties of Trees
	8.2	Root Tree
	8.3	Spanning Tree
	8.4	Minimal Spanning Tree

Literature

Compulsory Reading

Further Reading

- Benjamin, A., Chartrand, G., and Zhang, P. (2017). The fascinating world of graph theory. Princeton University Press.
- Erciyes, J. (2021). Discrete mathematics and graph theory: A concise study companion and guide. Princeton University Press.
- Lewis, H., & Zax, R. (2019). Essential discrete mathematics for computer science. Princeton University Press.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
84 h	36 h	0 h	30 h	0 h	150 h

Web Application Development

Module Code: CSEBCSWAD-01

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Sebastian Werning (Web Application Development)

Contributing Courses to Module

- Web Application Development (CSEBCSWAD01-01)

Module Exam Type	
Module Exam Study Format: Campus Studies Written Assessment: Case Study	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Architectural Foundations
- Tools of web development
- HTML
- CSS
- Javascript
- Web application testing and security

Learning Outcomes	
Web Application Development On successful completion, students will be able to ▪ identify important elements and describe the structure of current web application architectures. ▪ write simple static web pages using HTML. ▪ design simple web pages using CSS. ▪ store and handle structured information using XML. ▪ program simple dynamic web content using PHP.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Development.	**Links to other Study Programs of the University** All Bachelor Programmes in the IT & Technology field.

Web Application Development

Course Code: CSEBCSWAD01-01

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

Course Description

TThis course aims to empower students to program simple web applications using established technologies. At first, they will gain important insights into the typical structure of current web application architectures. Based on that knowledge, the students will learn the hypertext markup language (HTML) to develop simple web pages. Next, they will familiarize themselves with the most important and common elements of the cascading stylesheet (CSS) standard to layout the content written in HTML. To implement simple dynamic web pages, students learn how to use Javascript and exemplary supporting frameworks. This is combined with the use of relevant tools for the development and source code management of web pages. Finally, they will learn the very basics of the web page testing and security.

Course Outcomes

On successful completion, students will be able to

- identify important elements and describe the structure of current web application architectures.
- write simple static web pages using HTML.
- design simple web pages using CSS.
- store and handle structured information using XML.
- program simple dynamic web content using PHP.

Contents

1. Architectural Foundations
    - 1.1 Structure and History of the Internet
    - 1.2 Internet protocols and URIs
    - 1.3 Web application architecture
    - 1.4 Current trends

2. Tools of web development
    - 2.1 Development Tools
    - 2.2 Version management
    - 2.3 Package Manager
    - 2.4 Upload/Deployment

3. Static web pages developement
   - 3.1 Fundamentals of HTML5
   - 3.2 Fundamentals of CSS

4. Advanced design techniques
   - 4.1 Responsive web design
   - 4.2 Page layout
   - 4.3 Media queries
   - 4.4 CSS Frameworks (Bootstrap)

5. Web page development with JavaScript
   - 5.1 JavaScript history, ES5/ES6
   - 5.2 JavaScript fundamentals
   - 5.3 Use of JSON
   - 5.4 Common JavaScript Frameworks

6. Web application testing and security
   - 6.1 Testing of web applications
   - 6.2 Basic security concepts and principles

Literature

Compulsory Reading

Further Reading

- Ferguson, R. (2019). Beginning JavaScript: The ultimate guide to modern JavaScript development (3rd ed.). Apress.
- Sunyaev, A. (2020). Internet computing: Principles of distributed systems and emerging internet based technologies. Springer

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Case Study

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
94 h	36 h	0 h	20 h	0 h	150 h

Collaborative Work

Module Code: CSEBCSCW-01

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Karin Halbritter (Collaborative Work)

Contributing Courses to Module
▪ Collaborative Work (CSEBCSCW01-01)

Module Exam Type	
Module Exam Study Format: Campus Studies Exam, 90 Minutes	**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 learning processes both self-directed and collaborative with analog and digital media. ▪ initiate face-to-face and virtual cooperation and select suitable methods for shaping collaboration even in an intercultural context and across disciplinary boundaries. ▪ assess different forms of communication in relation to the goals and requirements of different situations and to reflect on their own communication and argumentation behavior in order to be able to shape conducive collaboration also in an interdisciplinary context. ▪ recognize social diversity including cultural and professional differences as a value, and to name and apply tools to deal with them constructively. ▪ explain conflict potentials and the role of emotions in conflicts and to describe the use of systemic methods in the target- and solution-oriented handling of conflicts. ▪ analyze one's own resources, present methods of self-leadership 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 the University** All Bachelor Programmes in the Business field

Collaborative Work

Course Code: CSEBCSCW01-01

Study Level	Language of Instruction and Examination	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 learning processes both self-directed and collaborative with analog and digital media.
- initiate face-to-face and virtual cooperation and select suitable methods for shaping collaboration even in an intercultural context and across disciplinary boundaries.
- assess different forms of communication in relation to the goals and requirements of different situations and to reflect on their own communication and argumentation behavior in order to be able to shape conducive collaboration also in an interdisciplinary context.
- recognize social diversity including cultural and professional differences as a value, and to name and apply tools to deal with them constructively.
- explain conflict potentials and the role of emotions in conflicts and to describe the use of systemic methods in the target- and solution-oriented handling of conflicts.
- analyze one's own resources, present methods of self-leadership and self-motivation, and derive appropriate strategies.

Contents

1. Learning for a Networked World, in a Networked World
    - 1.1 Requirements and Opportunities in the “VUCA” World
    - 1.2 Learning, Knowing and Not-Knowing
    - 1.3 The 4C Model: Collective, Collaborative, Continuous, and Connected
    - 1.4 Monitoring Learning Behaviour

Literature
Compulsory Reading
Further Reading ▪ Baber, A., Waymon, L., Alphonso, A., & Wylde, J. (2015). Strategic connections: The new face of networking in a collaborative world. AMACOM. ▪ Kaats, E., & Opheij, W. (2014). Creating conditions for promising collaboration: Alliances, networks, chains, strategic partnerships. Springer. ▪ Martin, S. J., Goldstein, N. J., & Cialdini, R. B. (2014). The small BIG: Small changes that spark BIG influence. Profile Books. ▪ Oettingen, G. (2014). Rethinking positive thinking: Inside the new science of motivation. Current.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Instructional Methods	
Learning Material ☑ Course Book ☑ Video ☑ Slides	**Exam Preparation** ☑ Online Tests ☑ Practice Exam

Statistics: Probability and Descriptive Statistics

Module Code: CSEBDSSPDS-01

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Veronica Mas (Statistics: Probability and Descriptive Statistics)

Contributing Courses to Module
▪ Statistics: Probability and Descriptive Statistics (CSEBDSSPDS01-01)

Module Exam Type	
Module Exam Study Format: Campus Studies 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	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Methods	All Bachelor Programs in the Business field

Statistics: Probability and Descriptive Statistics

Course Code: CSEBDSSPDS01-01

Study Level	Language of Instruction and Examination	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 continous 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

- Downey, A.B. (2014). Think stats (2nd ed.). O'Reilly.
- Rohatgi, V. K., & Saleh, A. K. E. (2015). An introduction to probability and statistics. John Wiley & Sons, Incorporated.
- Triola , M.F. (2013). Elementary statistics. Pearson Education.
- Wagaman, A.S & Dobrow, R.P. (2021). Probability: With applications and R. Wiley.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
84 h	36 h	0 h	30 h	0 h	150 h

Computer Architecture and Operating Systems

Module Code: CSEBCSCAOS

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	CSEBCSICS01	BA	5	150 h

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

Module Coordinator

Prof. Dr. Paul Libbrecht (Computer Architecture and Operating Systems)

Contributing Courses to Module

- Computer Architecture and Operating Systems (CSEBCSCAOS01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- Basic Concepts for Computer Architecture
- Computer Architecture
- Computer Hardware
- Assembly Languages
- Operating Systems Basics
- Popular Operating Systems

Learning Outcomes	
Computer Architecture and Operating Systems On successful completion, students will be able to ▪ to explain the basic concepts of computer architecture. ▪ compare the different types of computer hardware. ▪ describe the meaning and functionality of simple assembly programs. ▪ explain the basic functions of operating systems. ▪ compare the different types of operating systems.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Computer Science & Software Development.	All Bachelor Programs in the IT & Technology field.

Computer Architecture and Operating Systems

Course Code: CSEBCSCAOS01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBCSICS01

Course Description

This course introduces a fundamental topic of computer science.The architecture of computers and the inner workings of operating systems are fundamental concepts of computer science. This course introduces this topic, including an overview of the various types of computer hardware and an overview of assembly languages, which form a link between computer architecture and operating systems.

Course Outcomes

On successful completion, students will be able to

- to explain the basic concepts of computer architecture.
- compare the different types of computer hardware.
- describe the meaning and functionality of simple assembly programs.
- explain the basic functions of operating systems.
- compare the different types of operating systems.

Contents

1. Basic Concepts for Computer Architecture
   - 1.1 Historical Overview
   - 1.2 Digital Logic and Binary Arithmetic
   - 1.3 Semiconductor Technology
   - 1.4 Hardware Design and Hardware Description Languages
2. Computer Architecture
   - 2.1 Computer Architecture Design Goals
   - 2.2 Instruction Set Architecture
   - 2.3 Microarchitecture
   - 2.4 System Design
3. Computer Hardware
   - 3.1 Personal Computers
   - 3.2 Mainframes
   - 3.3 Servers

3.4 Supercomputers
3.5 Mobile Systems
3.6 Embedded Systems

4. Assembly Languages
   4.1 Role and Importance of Assembly Languages
   4.2 Introduction to Programming in Assembly Languages
   4.3 Compiling and Linking
   4.4 Application of Assembly Languages

5. Operating Systems Basics
   5.1 Role and Types of Operating Systems
   5.2 Operating System Kernel
   5.3 File Systems
   5.4 Memory Management
   5.5 Processes and Threads
   5.6 Security

6. Popular Operating Systems
   6.1 Basic Concepts of Windows
   6.2 Basic Concepts of Unix and Linux
   6.3 Basic Concepts of Apple Operating Systems
   6.4 Basic Concepts of Mobile Operating Systems

Literature

Compulsory Reading

Further Reading

- Harris, D.M./Harris, S.L. (2013): Digital Design and Computer Architecture. 2nd edition, Morgan Kaufman, Waltham, MA.
- Patt, Y.N./Patel, S.J. (2019): Introduction to Computing Systems: From Bits & Gates to C/C++ & Beyond. 3rd edition, McGraw-Hill Education, New York.
- Tanenbaum, A.S./Bos, H. (2014): Modern Operating Systems. 4th edition, Pearson Education, Harlow.
- Tutorials Point (2020): Assembly Programming Tutorial. (URL: [last access 2020-02-04]).

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Project: Java and Web Development

Module Code: CSEBCSPJWD

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum	CSEBCSOOPJ01, CSEBCSDSJCL01, CSEBCSWAD01-01	BA	5	150 h

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

Module Coordinator
Dr. Christian Remfert (Project: Java and Web Development)

Contributing Courses to Module
▪ Project: Java and Web Development (CSEBCSPJWD01)

Module Exam Type	
Module Exam Study Format: Campus Studies Portfolio	**Split Exam**
Weight of Module see curriculum	

Module Contents	
▪ This course focuses on the development of practical skills. For a given problem and/or context, students independently plan, design, develop, and evaluate small web applications. A set of specific problems and contexts are provided by the tutor and may vary. Each student chooses one and creates an individual solution, the results of which are gathered in a portfolio.	
Learning Outcomes **Project: Java and Web Development** On successful completion, students will be able to ▪ plan the development process of small web applications. ▪ specify requirements of small web applications to fulfill given needs. ▪ design and develop web applications that meet specific requirements. ▪ evaluate if a developed web application meets the specified requirements.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Development	**Links to other Study Programs of the University** All Bachelor Programmes in the IT & Technology field

Project: Java and Web Development

Course Code: CSEBCSPJWD01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBCSOOPJ01, CSEBCSDSJCL01, CSEBCSWAD01-01

Course Description

This course focuses on the development of practical skills. Students apply their skills to create a small web application that fulfills a set of given needs and evaluate the result. The results are gathered and presented in a portfolio which will be assessed.

Course Outcomes

On successful completion, students will be able to

- plan the development process of small web applications.
- specify requirements of small web applications to fulfill given needs.
- design and develop web applications that meet specific requirements.
- evaluate if a developed web application meets the specified requirements.

Contents

- To a given problem and/or a given context, the students plan, design, develop and evaluate small web applications on their own authority. A set of specific problems and contexts are provided by the tutor and may vary. The students choose one and create their own solution.

Literature

Compulsory Reading

Further Reading

- Bloch, J. (2017). Effective Java (3rd ed.). Boston, MA: Addison-Wesley.
- Harrer, S., Lenhard, J., & Dietz, L. (2018). Java by comparison: Become a Java craftsman in 70 examples. Raleigh, NC: Pragmatic Bookshelf.
- Martin, R. M. (2017). Clean architecture: A craftsman's guide to software structure and design. Boston, MA: Prentice Hall.
- Freeman, E., & Robson, E. (2004). Head first design patterns: A brain-friendly guide. Sebastopol, CA: O'Reilly.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Portfolio

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
114 h	36 h	0 h	0 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Slides	☑ Guideline

Database Modeling and Database Systems

Module Code: CSEBCSDMDS

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Carsten Skerra (Database Modeling and Database Systems)

Contributing Courses to Module

- Database Modeling and Database Systems (CSEBCSDMDS01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- 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

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.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Data Science & Artificial Intelligence	All Bachelor Programs in the IT & Technology field

Database Modeling and Database Systems

Course Code: CSEBCSDMDS01

Study Level	Language of Instruction and Examination	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

- Date, C.J. (2019). Database design and relational theory: Normal forms and all that jazz (2nd ed.). Apress.
- Elmasri, R., & Navathe, S. (2017). Fundamentals of database systems (7th ed., global ed.). Pearson.
- Esakkirajan, S., & Sumathi, S. (2007). Fundamentals of relational database management systems [electronic resource] : Springer.
- Foster, E. C., & Godbole, S. V. (2016). Database systems: a pragmatic approach (2nd ed.). Apress.
- W3Schools (2020). SQL Tutorial.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Project: Build a Data Mart in SQL

Module Code: CSEBDSPBDM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Silke Vaas (Project: Build a Data Mart in SQL)

Contributing Courses to Module
▪ Project: Build a Data Mart in SQL (CSEBDSPBDM01)

Module Exam Type	
Module Exam Study Format: Campus Studies Portfolio	**Split Exam**
Weight of Module see curriculum	

Module Contents

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

Learning Outcomes	
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	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Data Science & Artificial Intelligence	All Bachelor Programs in the IT & Technology field

Project: Build a Data Mart in SQL

Course Code: CSEBDSPBDM01

Study Level	Language of Instruction and Examination	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. O'Reilly. ▪ DeBarros, A. (2018). Practical SQL: A beginner's guide to storytelling with data. No Starch Press. ▪ Harrington, J. L. (2016). Relational database design and implementation (4th ed.). Morgan Kaufmann. ▪ Hernandez, M. J. (2013). Database design for mere mortals: A hands-on guide to relational database design (3rd ed.). Addison-Wesley. ▪ Viescas, J. (2018). SQL queries for mere mortals: A hands-on guide to data manipulation in SQL (4th ed.). Addison-Wesley.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Portfolio

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
114 h	36 h	0 h	0 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Slides	☑ Guideline

Requirements Engineering

Module Code: CSEBCSRE

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Andrew Adjah Sai (Requirements Engineering)

Contributing Courses to Module

- Requirements Engineering (CSEBCSRE01)

Module Exam Type	
Module Exam Study Format: Campus Studies Exam, 90 Minutes	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Basics of requirements engineering
- Enterprise modeling
- Requirement determination techniques
- Techniques of requirements documentation
- Testing and coordination of requirements
- Managing requirements

<table>
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Learning Outcomes

Requirements Engineering

On successful completion, students will be able to

- describe models of enterprise modeling relevant to IT support and have experience in modeling.
- understand techniques and methods for determining requirements of IT systems and be able to distinguish them from each other.
- understand techniques for the documentation of requirements on IT systems and have experience in their use.
- describe techniques for testing, coordinating, and managing the requirements of IT systems and be able to distinguish between them.
- independently select suitable techniques and methods of requirements engineering for given project situations.

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Links to other Modules within the Study Program

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

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Links to other Study Programs of the University

All Bachelor Programs in the IT & Technology field

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</table>

Requirements Engineering

Course Code: CSEBCSRE01

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

Course Description

The early phases of software development are largely characterized by the fact that functional and technical requirements for the IT system have to be determined. The determination of these requirements must be carried out extremely carefully because all of the following activities in the SW development process are planned and executed on the basis of documented requirements. In this course, procedures, methods, and models are covered, which make it possible to have a structured and methodical determination and documentation of requirements for operational information systems.

Course Outcomes

On successful completion, students will be able to

- describe models of enterprise modeling relevant to IT support and have experience in modeling.
- understand techniques and methods for determining requirements of IT systems and be able to distinguish them from each other.
- understand techniques for the documentation of requirements on IT systems and have experience in their use.
- describe techniques for testing, coordinating, and managing the requirements of IT systems and be able to distinguish between them.
- independently select suitable techniques and methods of requirements engineering for given project situations.

Contents

1. Fundamentals and Terms of Requirements Engineering
   - 1.1 Requirements Engineering in the Software Process
   - 1.2 Core Activities in Requirements Engineering
   - 1.3 What is a Requirement?

2. Determination of Requirements
   - 2.1 Determination of the System Context
   - 2.2 Determination of the Sources of Requirements
   - 2.3 Selection of the Appropriate Investigative Techniques
   - 2.4 Determine Requirements Using Techniques

3. Selected Investigative Techniques
   - 3.1 Creativity Techniques
   - 3.2 Interview Techniques
   - 3.3 Observation Techniques
   - 3.4 Prototyping

4. Documentation of Requirements
   - 4.1 Activities for Documenting Requirements
   - 4.2 Typical Elements of Requirements Documentation
   - 4.3 Forms of Documentation

5. Modeling of Processes
   - 5.1 Basics and Terms
   - 5.2 Modeling with the Business Process Model and Notation
   - 5.3 Modeling with Event Driven Process Chains

6. Modeling of Systems
   - 6.1 Fundamentals of Unified Modeling Language
   - 6.2 UML Use Case Diagram
   - 6.3 UML Activity Diagram
   - 6.4 UML Class Diagram
   - 6.5 UML State Diagram

7. Checking and Reconciling Requirements
   - 7.1 Activities for Checking and Reconciling Requirements
   - 7.2 Test Criteria
   - 7.3 Test Principles
   - 7.4 Testing Techniques
   - 7.5 Coordination of Requirements

8. Management of Prioritization Requirements and Techniques
   - 8.1 Managing Requirements
   - 8.2 Techniques for Prioritizing Requirements

Literature
Compulsory Reading
Further Reading ▪ Dick, J., Hull, E., & Jackson, K. (2017). Requirements engineering (4th ed.). Springer. ▪ Glinz, M., van Loenhoud, H., Staal, S., & Bühne, S. (2020). Handbook for the CPRE foundation level according to the IREB standard: Education and training for certified professional for requirements engineering (CPRE): Foundation level (Version 1.0.0). InternationalRequirements Engineering Board. ▪ Pohl, K., & Rupp, C. (2015). Requirements engineering fundamentals: A study guide for the certified professional for requirements engineering exam: Foundation level—IREB compliant (2nd ed.). Rocky Nook.

Study Format Campus Studies

Study Format	**Course Type**
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Instructional Methods

Learning Material	**Exam Preparation**
☑ Course Book	☑ Practice Exam
☑ Video	☑ Online Tests
☑ Slides	

Operating Systems, Computer Networks, and Distributed Systems

Module Code: CSEBIBRVS_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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Ahmed Taha (Operating Systems, Computer Networks, and Distributed Systems)

Contributing Courses to Module

- Operating Systems, Computer Networks, and Distributed Systems (CSEBIBRVS01_E)

Module Exam Type	
Module Exam Study Format: Campus Studies Exam, 90 Minutes	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Operating systems
- Computer networks
- Distributed systems
- Mobile computing

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Learning Outcomes

Operating Systems, Computer Networks, and Distributed Systems

On successful completion, students will be able to

- explain the basic functions of operating systems.
- compare different operating systems.
- explain and compare the OSI reference model and the TCP/IP protocol stack.
- explain the most important IP-based protocols and services and their application.
- explain and compare different architectures for distributed systems.
- explain and compare the main mobile communication networks.
- explain basic challenges of the security on the Internet and their solutions.

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Links to other Modules within the Study Program

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

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Links to other Study Programs of the University

All Bachelor Programs in the IT & Technology field

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</table>

Operating Systems, Computer Networks, and Distributed Systems

Course Code: CSEBIBRVS01_E

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

Course Description

Operating systems are a central component of computers and provide their basic functions. To an increasing extent, however, computers do not stand alone, but are integrated into networks within which data and functions of other computer systems can be accessed. This enables distributed systems in which data and functions are systematically assigned to different computers in order to perform jointly defined tasks. While in the past, the various computers were stationary, many mobile computers are now also in use, which leads to completely new application scenarios in both private and business contexts.

Course Outcomes

On successful completion, students will be able to

- explain the basic functions of operating systems.
- compare different operating systems.
- explain and compare the OSI reference model and the TCP/IP protocol stack.
- explain the most important IP-based protocols and services and their application.
- explain and compare different architectures for distributed systems.
- explain and compare the main mobile communication networks.
- explain basic challenges of the security on the Internet and their solutions.

Contents

1. Foundations of Operating Systems
    - 1.1 Basic Structure of Computer Systems
    - 1.2 File Systems
    - 1.3 Memory Management
    - 1.4 Processes and Threads

2. Common Operating Systems
    - 2.1 Basic Concepts: Windows
    - 2.2 Basic Concepts: Unix and Linux
    - 2.3 Basic Concepts: Apple Operating Systems
    - 2.4 Mobile Operating Systems

3. Computer Networks
   - 3.1 Principles of Data Transmission
   - 3.2 The OSI Reference Model
   - 3.3 Network Topologies

4. TCP/IP And Internet
   - 4.1 Historical background
   - 4.2 TCP/IP Protocol Stack
   - 4.3 Selected IP-Based Protocols and Services
   - 4.4 Online Security

5. Architectures of Distributed Systems
   - 5.1 Client-Server Systems and Distributed Applications
   - 5.2 Basic Concepts of Distributed Systems: Concurrency, Semaphores, Deadlock
   - 5.3 Communication in Distributed Systems
   - 5.4 Service Orientation: SOA, Web Services and Microservices
   - 5.5 Cloud Applications
   - 5.6 Transactions in Distributed Systems
   - 5.7 High-Performance Computing Cluster

6. Mobile Computing
   - 6.1 Basics, Techniques and Protocols for Mobile Computing
   - 6.2 Mobile Internet and its Applications
   - 6.3 Mobile Communication Networks
   - 6.4 Security And Data Protection in Mobile Systems

Literature

Compulsory Reading

Further Reading

- Tanenbaum, A. S., & Bos, H. (2015). Modern operating systems (4th ed.). Pearson.
- Tanenbaum A. S., & Wetherall, D. J. (2014) . Computer networks (5th ed.). Pearson.
- van Steen, M., & Tanenbaum , A. S. (2017). Distributed systems. (3rd ed.). Pearson. Available online.

Study Format Campus Studies

Study Format Campus Studies	**Course Type** Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study 84 h	**Contact Hours** 36 h	**Tutorial/Tutorial Support** 0 h	**Self Test** 30 h	**Independent Study** 0 h	**Hours Total** 150 h

Algorithms, Data Structures, and Programming Languages

Module Code: CSEBCSL-02

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 and Examination
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

Module Coordinator

Musharaf Ahmed Doger (Algorithms, Data Structures, and Programming Languages)

Contributing Courses to Module

- Algorithms, Data Structures, and Programming Languages (CSEBCSL01-02)

Module Exam Type	
Module Exam Study Format: Campus Studies Written Assessment: Written Assignment	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Data Structures
- Algorithm Design
- Important Algorithms
- Programming Paradigms and the Basic Terms of Programming Languages
- Programme Analysis Tools
- Overview of Common Programming Languages

Learning Outcomes	
Algorithms, Data Structures, and Programming Languages On successful completion, students will be able to ▪ explain basic data structures and compare and apply them in concrete applications. ▪ explain basic algorithms. ▪ design, select and apply suitable algorithms and data structures for specific applications ▪ analyse sketched or programmed algorithms when or before running them ▪ explain and compare the common programming paradigms and programming languages.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Computer Science & Software Development	All Bachelor Programmes in the IT & Technology field

Algorithms, Data Structures, and Programming Languages

Course Code: CSEBCSL01-02

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

Course Description

Programming essentially consists of selecting suitable algorithms and data structures for a specific task and converting them into program code. There are many different programming languages, which are based on different procedures and in which algorithms and data structures are implemented differently. In this module, these concepts, which have so far been dealt with using concrete examples, are systematically presented and applied more broadly in order to give students the necessary tools to develop a systematic approach to programming.

Course Outcomes

On successful completion, students will be able to

- explain basic data structures and compare and apply them in concrete applications.
- explain basic algorithms.
- design, select and apply suitable algorithms and data structures for specific applications
- analyse sketched or programmed algorithms when or before running them
- explain and compare the common programming paradigms and programming languages.

Contents

1. Basic Concepts
   - 1.1 Algorithms, Data Structures, and Programming Languages as the Basics of Programming
   - 1.2 Detailing and Abstraction
   - 1.3 Control Structures
   - 1.4 Types of Data
   - 1.5 Basic Data Structures (List, Chain, Tree)
2. Data Structures
   - 2.1 Advanced Data Structures: Queue, Heap, Stack, Graph
   - 2.2 Abstract Data Types, Objects, and Classes
   - 2.3 Polymorphism
3. Algorithm Design

3.1 Induction, Iteration, and Recursion
3.2 Methods of Algorithm Design
3.3 Correctness and Verification of Algorithms
3.4 Efficiency (Complexity) of Algorithms

4. Basic Algorithms
   4.1 Traversing and Linearization of Trees
   4.2 Search Algorithms
   4.3 Sorting Algorithms
   4.4 Search in Strings
   4.5 Hash Algorithms
   4.6 Pattern Recognition

5. Representing Structured Data
   5.1 Structure of XML Documents
   5.2 Accessing XML Documents Programmatically
   5.3 Transformation of XML Documents Using XSL
   5.4 JSON as an Alternative to XML

6. Measuring Programmes
   6.1 Type Inference and IDE Interactive Support
   6.2 Cyclomatic and Referential Complexity
   6.3 Digesting Code Documentation
   6.4 Compiler Optimization
   6.5 Code Coverage
   6.6 Unit and Integration Testing
   6.7 Heap Analysis

7. Programming Languages
   7.1 Programming Paradigms
   7.2 Execution of Programs
   7.3 Types of Programming Languages
   7.4 Syntax, Semantics, and Pragmatics
   7.5 Variables and Type Systems

8. Overview of Important Programming Languages
   8.1 Assembler and Webassembly
   8.2 C and C++

8.3	Java and C#
8.4	Haskell and Lisp
8.5	JavaScript and Its Relatives
8.6	Other Imperative Programming Languages

Literature

Compulsory Reading

Further Reading

- Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2022). Introduction to algorithms (4th ed.). MITPress.
- Sebesta, R. W. (2016). Concepts of programming languages (11th ed.). Pearson.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Written Assignment

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
94 h	36 h	0 h	20 h	0 h	150 h

IT Service Management

Module Code: CSEBCSITSM-02

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. André Köhler (IT Service Management)

Contributing Courses to Module

- IT Service Management (CSEBCSITSM01-02)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- IT Service Management Basics and Terms
- ITIL 4 - Basics and Four Dimensions
- ITIL 4 - Service Value System
- ITIL 4 - Principles
- ITIL 4 - Practices
- Information Security Management

Learning Outcomes	
IT Service Management On successful completion, students will be able to ▪ identify the fundamentals and challenges of IT service management. ▪ describe the motivation and structure of the IT Infrastructure Library (ITIL), distinguish four dimensions, apply the service value system and identify concrete practices. ▪ describe and apply fundamentals of IT security management.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Development	**Links to other Study Programs of the University** All Bachelor Programs in the IT & Technology field

IT Service Management

Course Code: CSEBCSITSM01-02

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

Course Description
IT service management is an approach to align and understand a company's IT as a service provider and supporter of operational and business processes. This course uses the IT Infrastructure Library (ITIL) to teach concepts, procedures and best practices in the area of IT service management (IT operations). In other words, it looks at the management of activities that take place after an IT system has been developed: IT operations as a continuous run of the productive day-to-day business of a company's IT departments.

Course Outcomes

On successful completion, students will be able to

- identify the fundamentals and challenges of IT service management.
- describe the motivation and structure of the IT Infrastructure Library (ITIL), distinguish four dimensions, apply the service value system and identify concrete practices.
- describe and apply fundamentals of IT security management.

Contents

1. IT Service Management Basics and Terms
   - 1.1 IT Services
   - 1.2 IT Service Management
   - 1.3 ITSM Frameworks
2. ITIL 4 - Basics and Four Dimensions
   - 2.1 Stakeholders, Services and Service Management
   - 2.2 Value Contribution of IT
3. ITIL 4 - Service Value System
   - 3.1 Basics and Overview
   - 3.2 Inputs, Outcome and Governance
   - 3.3 The Service Value Chain
   - 3.4 Continual Improvement
4. ITIL 4 - Principles

4.1 Overview
4.2 Value Orientation
4.3 Iterative Procedure and Feedback
4.4 Establish Collaboration and Visibility
4.5 Optimize and Automate

5. ITIL 4 - Practices
5.1 Overview
5.2 General Management Practices
5.3 Service Management Practices
5.4 Technical Practices

6. Information Security Management
6.1 Information Security Basics
6.2 Standards, Best Practices and Legal Requirements
6.3 Information Security Management with ISO/IEC 27001

Literature

Compulsory Reading

Further Reading

- Agutter, C. (2019). ITIL® foundation essentials ITIL 4 edition: The ultimate revision guide. ITGovernance Publishing.
- Axelos Limited. (2019). ITIL 4 foundation: ITIL 4 edition. The Stationery Office.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Course Book	☑ Practice Exam
☑ Video	☑ Online Tests
☑ Slides	

Project: IT Service Management

Module Code: CSEBCSPITSM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Dr. Frank Müller (Project: IT Service Management)

Contributing Courses to Module
▪ Project: IT Service Management (CSEBCSPITSM01)

Module Exam Type	
Module Exam Study Format: Campus Studies Written Assessment: Project Report	**Split Exam**
Weight of Module see curriculum	

Module Contents
▪ All phases of an ITIL/IT project are carried out as part of an independent project.

<table>
<tr><td colspan="2">
Learning Outcomes
Project: IT Service Management
On successful completion, students will be able to

analyze typical problems and company situations from the area of IT service management in different project variations.
develop, plan, and implement proposed solutions.
convert theory into a pragmatic approach to a solution with the help of methodical tools from IT service management and project management.
draw and apply the right conclusions in relation to their specific project environment.
conceptually apply their theoretical knowledge to company-specific environmental factors.

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<tr><td>Links to other Modules within the Study Program
This module is similar to other modules in the field of Computer Science & Software Development</td><td>Links to other Study Programs of the University
All Bachelor Programs in the IT & Technology field</td></tr>
</table>

Project: IT Service Management

Course Code: CSEBCSPITSM01

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

Course Description

Based on the contents of the course "IT Service Management", selected aspects of the core processes of ITIL are deepened, discussed, selected, and applied within the framework of a project in a concept-related manner. All theoretical methods are considered and evaluated.

Course Outcomes

On successful completion, students will be able to

- analyze typical problems and company situations from the area of IT service management in different project variations.
- develop, plan, and implement proposed solutions.
- convert theory into a pragmatic approach to a solution with the help of methodical tools from IT service management and project management.
- draw and apply the right conclusions in relation to their specific project environment.
- conceptually apply their theoretical knowledge to company-specific environmental factors.

Contents

- Analysis, evaluation, and development of recommendations for taking action within the scope of concrete questions concerning aspects of IT Service Management. This is aided by the creation and planning of a project in the theoretical-theme context through all phases of project management.
- The quality assurance of the artefacts created is carried out both by the tutor and by students from the project groups.

Literature
Compulsory Reading
Further Reading

- Al-Ashmoery, Y., Haider, H., Haider, A., Nasser, N., & Al-Sarem, M. (2021). Impact of IT Service Management and ITIL Framework on the Businesses. 2021 International Conference of Modern Trends in Information and Communication Technology Industry (MTICTI), Modern Trends in Information and Communication Technology Industry (MTICTI), 2021 International Conference Of, 1–5.
- Limited, A. (2020). ITIL 4. Create, Deliver and Support. TSO.
- Limited, A. (2020). ITIL 4: Direct, Plan and Improve. TSO.
- Limited, A. (2019). ITIL foundation: ITIL (4th edition). The Stationery Office Ltd.
- Shastri, A., & Thampi, G. T. (2021). Automation of IT Service Management Processes. 2021 International Conference on Advances in Computing, Communication, and Control (ICAC3), Advances in Computing, Communication, and Control (ICAC3), 2021 International Conference On, 1–4.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
114 h	36 h	0 h	0 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Slides	☑ Guideline

Theoretical Computer Science and Mathematical Logic

Module Code: CSEBCSTCSML

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Robert Graf (Theoretical Computer Science and Mathematical Logic)

Contributing Courses to Module

- Theoretical Computer Science and Mathematical Logic (CSEBCSTCSML01)

Module Exam Type	
Module Exam Study Format: Campus Studies Exam, 90 Minutes	**Split Exam**
Weight of Module see curriculum	

Module Contents

- Proposition and predicate logic
- Finite automata
- Formal languages
- Computability and Turing machines
- Complexity theory
- Petri nets

Learning Outcomes	
Theoretical Computer Science and Mathematical Logic On successful completion, students will be able to ▪ formulate and translate predicate logical relationships into programming languages. ▪ use finite automatons and regular expressions to describe technical facts. ▪ explain the Chomsky hierarchy. ▪ identify the limits of provability and predictability. ▪ explain the meaning and relevance of the P=NP problem. ▪ apply Petri nets for the description of technical facts.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Computer Science & Software Development	All Bachelor Programs in the IT & Technology field

Theoretical Computer Science and Mathematical Logic

Course Code: CSEBCSTCSML01

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

Course Description

Theoretical computer science and mathematical logic form the theoretical basics of computer science. However, this is not "pure theory", as these fundamentals are applied in many areas of computer science. These include, for example, the formulation of conditions in SQL queries or other programs based on statement and predicate logic, the use of finite state machines to specify systems with state transition diagrams, and the modeling of business and other processes with Petri nets. In addition, theoretical computer science and mathematical logic analyze the limits of computer science and computability, which cannot be exceeded irrespective of the technologies and algorithms used.

Course Outcomes

On successful completion, students will be able to

- formulate and translate predicate logical relationships into programming languages.
- use finite automatons and regular expressions to describe technical facts.
- explain the Chomsky hierarchy.
- identify the limits of provability and predictability.
- explain the meaning and relevance of the P=NP problem.
- apply Petri nets for the description of technical facts.

Contents

1. Propositional Logic
   - 1.1 Basic Concepts
   - 1.2 Calculation Rules and Normal Forms
   - 1.3 Interpretation and Satisfiability
   - 1.4 Proof by Contradiction and Resolution
   - 1.5 Soundness and Completeness

2. Predicate Logic
   - 2.1 Basic Concepts
   - 2.2 Resolution in Predicate Logic
   - 2.3 Completeness and Incompleteness
   - 2.4 Logic Programming with Prolog

3. Finite Automata and Regular Expressions
    - 3.1 Basic Concepts of Finite Automata
    - 3.2 Regular Expressions and Languages
    - 3.3 Practical Applications

4. Formal Languages and Grammars
    - 4.1 Basic Concepts
    - 4.2 The Chomsky Hierarchy
    - 4.3 Context Free Languages (Type-2 Grammars)
    - 4.4 Context Sensitive Languages (Type-1 Grammars)

5. Computability and Turing Machines
    - 5.1 Models of Computability
    - 5.2 Turing Machines
    - 5.3 More Models of Computability
    - 5.4 Computability and Decidability and the Halting Problem

6. Complexity Theory
    - 6.1 Landau’s Big O Notation
    - 6.2 Basic Concepts of Complexity Theory
    - 6.3 P=NP?
    - 6.4 NP-Complete Problems

7. Petri Nets
    - 7.1 Basic Concepts of Graphs and Petri Nets
    - 7.2 Modeling Properties of Concurrent Systems
    - 7.3 Reachability in Petri Nets
    - 7.4 Invariants in Petri Nets

8. Applications of Mathematical Logic and Theoretical Computer Science
    - 8.1 Parser and Compiler
    - 8.2 Program Verification
    - 8.3 Artificial Intelligence
    - 8.4 Cryptology

Literature
Compulsory Reading
Further Reading ▪ Sipser, M. (2014). Introduction to the theory of computation (3rd ed.). Cengage Learning. ▪ Huth, M., & Ryan, M. (2004). Logic in computer science: Modelling and reasoning about systems (2nd ed.). Cambridge University Press. ▪ Reisig, W. (2013). Understanding Petri nets: Modeling techniques, analysis methods, case studies. Springer. ▪ Parkes, A. P. (2008). A concise introduction to languages and machines. Springer. ▪ Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2022). Introduction to algorithms (4th ed.). MIT Press.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Introduction to Programming with Python

Module Code: CSEBDSIPWP

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Dr. Cosmina Croitoru (Introduction to Programming with Python)

Contributing Courses to Module

- Introduction to Programming with Python (CSEBDSIPWP01)

Module Exam Type	
Module Exam Study Format: Campus Studies 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	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Data Science & Artificial Intelligence	All Bachelor Programs in the IT & Technology field

Introduction to Programming with Python

Course Code: CSEBDSIPWP01

Study Level	Language of Instruction and Examination	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. O'Reilly Media, Inc.
- Kapil, S. (2019). Clean Python: Elegant coding in Python. Apress.
- Lubanovic, B. (2019). Introducing Python (2nd ed.). O’Reilly.
- Lutz, M. (2013). Learning Python (5th ed.). O’Reilly.
- Matthes, E. (2015). Python crash course: A hands-on, project-based introduction to programming. No Starch Press.
- Müller, A. C., & Guido, S. (2016). Introduction to machine learning with Python: A guide for data scientists. O'Reilly Media, Inc.
- Ramalho, L. (2015). Fluent Python: Clear, concise, and effective programming. O’Reilly.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Software Quality Assurance

Module Code: CSEBCSSQA

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Tobias Brückmann (Software Quality Assurance)

Contributing Courses to Module

- Software Quality Assurance (CSEBCSSQA01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- Systematic quality assurance of requirements, architectures, and processes
- Systematic testing of software
- Dynamic quality assurance: Testing
- Static quality assurance: Surveying and measuring
- Constructive quality management
- Organization and planning of software quality
- Introduction to software quality assurance

Learning Outcomes	
Software Quality Assurance On successful completion, students will be able to ▪ understand motivation, use cases, and scenarios for aspects of quality management in the software process. ▪ understand important terms and the basis for the conception and execution of software tests. ▪ understand techniques and methods for constructive quality management and be able to distinguish them from each other. ▪ understand techniques and methods for analytical quality management and be able to distinguish them from one another. ▪ understand the general course of test activities and be able to select suitable methods and techniques for quality assurance for various artefacts and activities in the software process.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field(s) of Computer Science & Software Development.	All Bachelor Programmes in the IT & Technology field(s).

Software Quality Assurance

Course Code: CSEBCSSQA01

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

Course Description

Quality assurance is one of the accompanying activities of a software process. From the beginning, all created artefacts (documents, models, and program codes) must be quality-assured because the later an error in a system is detected, the more expensive it is to fix it.The course teaches techniques and procedures for accompanying quality assurance, starting with requirements analysis through to specification, architecture and design, and implementation. Even the quality assurance activities must be quality assured so that the software systems can be delivered at a good standard.

Course Outcomes

On successful completion, students will be able to

- understand motivation, use cases, and scenarios for aspects of quality management in the software process.
- understand important terms and the basis for the conception and execution of software tests.
- understand techniques and methods for constructive quality management and be able to distinguish them from each other.
- understand techniques and methods for analytical quality management and be able to distinguish them from one another.
- understand the general course of test activities and be able to select suitable methods and techniques for quality assurance for various artefacts and activities in the software process.

Contents

1. Introduction to Software Quality Assurance
   - 1.1 Motivation and Terms
   - 1.2 Principles of SW Quality Assurance
   - 1.3 Principles in Software Testing
   - 1.4 Cost of Quality
2. Organization and Planning of Software Quality
   - 2.1 Overview of the Quality Management Process
   - 2.2 Quality Planning and Quality Objectives
   - 2.3 Quality Assurance and Quality Improvement

Literature
Compulsory Reading
Further Reading ▪ Mahfuz, A. S. (2021): Software Quality Assurance. Integrating Testing, Security, and Audit. CRC Press, Boca Raton, FL, USA. ▪ Nicolette, D. (2015): Software Development Metrics. Manning Publications, Shelter Island, NY, USA. ▪ Pohl, K.; Rupp, C. (2015): Requirements Engineering Fundamentals. A Study Guide for the Certified Professional for Requirements Engineering Exam. Foundation Level – IREB compliant. 2nd Edition. Rocky Nook, Santa Barbara, CA. ▪ Sommerville, I. (2016): Software Engineering. 10th Edition. Pearson, Harlow, Essex, England. ▪ Walkinshaw, N. (2017): Software Quality Assurance. Consistency in the Face of Complexity and Change. Springer, Cham, Switzerland.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Course Book	☑ Practice Exam
☑ Video	☑ Online Tests
☑ Slides	

Specification

Module Code: CSEBCSS

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Holger Klus (Specification)

Contributing Courses to Module

- Specification (CSEBCSS01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Exam, 90 Minutes	

Weight of Module

see curriculum

Module Contents

- Basics of specification
- Specification of user interfaces (GUIs)
- Specification of components and their interfaces
- Technical specification of detailed technical data models
- Specification of business rules
- Specification of data interfaces
- Specification of web services
- Specification of quality and limiting contraints

Learning Outcomes	
Specification On successful completion, students will be able to ▪ know the motivation, use cases, and scenarios for the practical use of technical specifications. ▪ distinguish techniques from each other for the detailed specification of application interfaces and business logic of information systems and have experience with their use. ▪ identify and independently specify business objects and components. ▪ describe techniques for the detailed specification of technical interfaces between IT systems and be able to specify interfaces independently. ▪ explain techniques and procedures for the technical specification of quality properties and limiting conditions.	
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 the University** All Bachelor Programmes in the IT & Technology field(s).

Specification

Course Code: CSEBCSS01

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

Course Description

Based on the results of the technical requirements analysis, requirements for IT systems must be described as precisely as is appropriate for the respective situation. Based on specifications, project costs are estimated, and decisions are made about the internal design of the system.In this course different models and techniques that are used for the detailed specification of requirements for a system, subsystem, or system component are taught. The structure of the course is based on the structure of typical business information systems. In addition to the application layers, user interface, business logic, and data layer, the specification of web services is also covered.

Course Outcomes

On successful completion, students will be able to

- know the motivation, use cases, and scenarios for the practical use of technical specifications.
- distinguish techniques from each other for the detailed specification of application interfaces and business logic of information systems and have experience with their use.
- identify and independently specify business objects and components.
- describe techniques for the detailed specification of technical interfaces between IT systems and be able to specify interfaces independently.
- explain techniques and procedures for the technical specification of quality properties and limiting conditions.

Contents

1. Introduction to the Specification of Software Systems
   - 1.1 Basics and Terms for Specification
   - 1.2 Elements and Outlines of Specifications
   - 1.3 Structures and Forms of Documentation for Specification

2. Specification of User Interfaces (GUIs)
   - 2.1 Elements of a GUI Specification
   - 2.2 GUI Elements in Individual Dialog Masks
   - 2.3 Validations
   - 2.4 Navigation Between Dialogue Masks

3. Specification of System Components
    3.1 Introduction and Motivation for Components
    3.2 Specifying the Structure of Systems and Components
    3.3 Specification of Component Behavior

4. Specification of Technical System Interfaces
    4.1 Specifying Behavior at Interfaces of Components
    4.2 Data Structures at Interfaces of Components

5. Specification of Detailed Business Data Models
    5.1 Areas of Application of Technical Data Models
    5.2 Detailing the UML Class Diagram
    5.3 Checking Class Diagrams with UML Object Diagrams
    5.4 Typical Elements in Domain-Oriented Data Models

6. Specification of Data Interfaces with Structured Text
    6.1 Structured Text as Exchange Format
    6.2 Structure and Structure of XML Documents
    6.3 Definition of XML Languages
    6.4 Derivation of Class Diagrams From XML formats
    6.5 Specifying Web Services with WSDL

7. Specification of Quality Properties
    7.1 Quality and Quality Models
    7.2 Goal/Question/Metric Method (GQM)

Literature

Compulsory Reading

Further Reading

- Chonoloes, M. J. (2017). OCUP 2 certification guide: Preparing for the OMG certified UML 2.5professional 2 foundation exam. Morgan Kaufmann.
- Somerville, I. (2018). Software engineering (Global ed., 10th ed.). Pearson Education.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Course Book	☑ Practice Exam
☑ Video	☑ Online Tests
☑ Slides	

Project: Software Engineering

Module Code: CSEBCSPSE

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Thorsten Fröhlich (Project: Software Engineering)

Contributing Courses to Module
▪ Project: Software Engineering (CSEBCSPSE01)

Module Exam Type	
Module Exam Study Format: Campus Studies Written Assessment: Project Report	**Split Exam**
Weight of Module see curriculum	

Module Contents

- The knowledge acquired in the computer science modules from study semesters 1-3 is applied in small to medium-sized projects. Implementation is carried out in groups of approximately 3-7 students. Important stages of the software life cycle are covered, and the corresponding artifacts (e.g., specification of requirements, design, implementation, tests, and documentation) are created by the students. The quality assurance of these artefacts is carried out by the tutor and by students from other project groups. The students should learn about both the creation and the quality assurance of artefacts in the SW process.

Learning Outcomes	
Project: Software Engineering On successful completion, students will be able to ▪ have experience working on a complex project on a practical scenario of industrial SW development. ▪ understand the typical risks and pitfalls of large software projects within the framework of project realization and be able to use targeted strategies to minimize risks.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field(s) of Computer Science & Software Development.	All Bachelor Programmes in the IT & Technology field(s).

Project: Software Engineering

Course Code: CSEBCSPSE01

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

Course Description

The knowledge acquired in the computer science modules from study semesters 1-3 is applied in small to medium-sized projects. Implementation is carried out in groups of approximately 3-7 students. Important stages of the software life cycle are covered, and the corresponding artifacts (e.g., specification of requirements, design, implementation, tests, and documentation) are created by the students. The quality assurance of these artefacts is carried out by the tutor and by students from other project groups. Students will learn about the creation and the quality assurance of artefacts in the software process.

Course Outcomes

On successful completion, students will be able to

- have experience working on a complex project on a practical scenario of industrial SW development.
- understand the typical risks and pitfalls of large software projects within the framework of project realization and be able to use targeted strategies to minimize risks.

Contents

Literature

Compulsory Reading

Further Reading

- none

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
114 h	36 h	0 h	0 h	0 h	150 h

Seminar: Current Topics in Computer Science

Module Code: CSEBCSSCTCS

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Carsten Skerra (Seminar: Current Topics in Computer Science)

Contributing Courses to Module

- Seminar: Current Topics in Computer Science (CSEBCSSCTCS01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Written Assessment: Research Essay	

Weight of Module

see curriculum

Module Contents

- This seminar deals with current topics of computer science. Students make a dive deep into a specific topic within a sub-discipline of their choice.

<table>
<tr><td colspan="2">

Learning Outcomes

Seminar: Current Topics in Computer Science

On successful completion, students will be able to

- discuss in-depth and insightfully a given topic in the field of computer science.
- write about a certain computer science topic in terms of important characteristics, connections, and insights in the form of a research essay.
- execute the basics of scientific work and implement them in the context of a research essay.

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Links to other Modules within the Study Program

This module is similar to other modules in the field of Computer Science & Software Developement.

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Links to other Study Programs of the University

All Bachelor Programmes in the IT & Technology field

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</table>

Seminar: Current Topics in Computer Science

Course Code: CSEBCSSCTCS01

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

Course Description

This seminar is an opportunity for students to deepen the broad knowledge they will have gained over the previous four semesters of the study program. Students will choose a topic of specific individual interest that is connected to a sub-discipline of computer science. If a student, for example, is interested in the application of artificial intelligence in a specific context, elaborating context-specific use cases from a literature review can be the theme of the essay. Feedback provided by the tutor will help students strengthen any weaknesses they may have in scientific writing and academic work and prepare students for writing their bachelor thesis.

Course Outcomes

On successful completion, students will be able to

- discuss in-depth and insightfully a given topic in the field of computer science.
- write about a certain computer science topic in terms of important characteristics, connections, and insights in the form of a research essay.
- execute the basics of scientific work and implement them in the context of a research essay.

Contents

- Computer science is a broad subject area with many very different facets, depending on the specific sub-discipline. This seminar will address this diversity by taking up current trends in the context of individually-prepared texts. Each participant must create an essay for this purpose. Possible topics include Java and web development, data modeling and database systems, requirements engineering, and core computer science disciplines like operating systems, computer networks, distributed systems, algorithms, data structures, and programming languages.

Literature
Compulsory Reading
Further Reading ▪ Brookshear, G. / Bylow, D. (2014): Computer science: An overview. 12th edition, Pearson, Boston, MA. ▪ Gruhn,V. / Striemer, R. (Eds.) (2018): The essence of software engineering. Springer International Publishing, Cham. ▪ Springer. (n.d.) Lecture Notes in Computer Science. Springer, Heidelberg. ▪ Tardos, E. (Ed.). (n.d.) Journal of the ACM.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Research Essay

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
114 h	36 h	0 h	0 h	0 h	150 h

Introduction to Data Protection and Cyber Security

Module Code: CSEBCSIDPITS

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 and Examination
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 (CSEBCSIDPITS01)

Module Exam Type	
Module Exam Study Format: Campus Studies 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 of Computer Science & Software Development	**Links to other Study Programs of the University** All Bachelor Programs in the IT & Technology field

Introduction to Data Protection and Cyber Security

Course Code: CSEBCSIDPITS01

Study Level	Language of Instruction and Examination	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 Cyber Security
   - 1.1 Conceptual Bases, Protection Goals
   - 1.2 Attacks and Threats
   - 1.3 Security Strategy
   - 1.4 Legal Regulations

2. Data Protection
   - 2.1 Data Protection as a Personal Right
   - 2.2 Basic Principles of Data Protection
   - 2.3 EU General Data Protection Regulation
   - 2.4 Further International Regulations on Data Protection
   - 2.5 Cross-Border Data Flow
   - 2.6 Data Protection in Everyday Life

3. Basic Functions of Cyber Security and Their Implementation
   - 3.1 Identification and Authentication
   - 3.2 Rights Management

3.3 Rights Check
3.4 Preservation of Evidence

4. Cyber Security Management
   4.1 Basic Concepts and Standards in Cyber Security Management
   4.2 Series of Standards ISO 2700x

5. Cyber Security Management in Everyday Life
   5.1 Password Management
   5.2 Data Backup
   5.3 Email Security
   5.4 Protection Against Viruses and Other Malware
   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, Bluetooth, and NFC

7. Cyber Security in the Development of Software and Systems
   7.1 Protection of the Development Environment
   7.2 Secure Development
   7.3 Common Criteria

Literature

Compulsory Reading

Further Reading

- Arnold, R. (2017). Cybersecurity: A business solution. An executive perspective on managing cyber risk. Threat Sketch.
- European Parliament and Council of the European Union. (2016). EU General Data Protection Regulation (GDPR): Regulation 2016/679 of the European Parliament and of the council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Official Journal of the European Union. Chapters 1—3 .
- Mattord, H., & Whitman, M. (2017). Management of information security. Cengage.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
84 h	36 h	0 h	30 h	0 h	150 h

Cryptography

Module Code: CSEBCSCT-01

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Ralf Kneuper (Cryptography)

Contributing Courses to Module

- Cryptography (CSEBCSCT01-01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Written Assessment: Case Study	

Weight of Module

see curriculum

Module Contents

- Protection Targets, Vulnerabilities, and Threats
- Foundations of Cryptology and its Core Components
- Basic Cryptographic Applications
- Authentication
- Single Computer Security
- Security Communication Network
- Security E-Commerce
- Secure Software Development

Learning Outcomes

Cryptography

On successful completion, students will be able to

- give an overview of different classes of cryptographic systems.
- give a basic description of symmetric cryptographic methods, in particular One-Time Pad, DES, and AES, and describe their operating principles by means of simple, concrete examples.
- describe the basic hash functions.
- describe basic asymmetric cryptographic methods, especially RSA, and their operating principles by means of simple, concrete examples.
- describe the areas of application of cryptographic procedures and their application scenarios.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Computer Science & Software Developement	All Bachelor Programs in the IT & Technology field

Cryptography

Course Code: CSEBCSCT01-01

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

Course Description

This course covers basic and targeted in-depth knowledge of cryptographic processes and the practical use of cryptographic systems. After an overview of cryptographic methods, hash functions, symmetric methods, and asymmetric methods are presented. The theoretical basics of selected procedures are taught and practically explained using simple examples. In addition, areas of application and application scenarios for cryptographic procedures are presented.

Course Outcomes

On successful completion, students will be able to

- give an overview of different classes of cryptographic systems.
- give a basic description of symmetric cryptographic methods, in particular One-Time Pad, DES, and AES, and describe their operating principles by means of simple, concrete examples.
- describe the basic hash functions.
- describe basic asymmetric cryptographic methods, especially RSA, and their operating principles by means of simple, concrete examples.
- describe the areas of application of cryptographic procedures and their application scenarios.

Contents

1. Protection Goals, Vulnerabilities, and Threats
   - 1.1 Protection Goals
   - 1.2 Vulnerabilities and Threats
2. Foundations of Cryptology and its Core Components
   - 2.1 Encoding
   - 2.2 Symmetrical Encryption
   - 2.3 Asymmetric Encryption
   - 2.4 One-way Functions and Cryptographic Hash Functions
3. Basic Cryptographic Applications
   - 3.1 Key Exchange and Hybrid Processes
   - 3.2 Digital Signature

Literature
Compulsory Reading
Further Reading ▪ Paar, C. & Pelzl, J. (2010). Understanding Cryptography. A Textbook for Students and Practitioners. Springer. ▪ Singh, S. (1999). The code book [electronic resource] : the science of secrecy from ancient Egypt to quantum cryptography (1. ed.). Anchor Books. ▪ Smart, N. P. (2016). Cryptography Made Simple. Springer.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Case Study

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
94 h	36 h	0 h	20 h	0 h	150 h

Salesforce Platform Development

Module Code: DLSFPD

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Thomas Bolz (Project: Salesforce Platform App Builder) / Prof. Dr. Thomas Bolz (Project: Salesforce Platform Developer)

Contributing Courses to Module

- Project: Salesforce Platform App Builder (DLSFPD01)
- Project: Salesforce Platform Developer (DLSFPD02)

Module Exam Type	
Module Exam	**Split Exam** Project: Salesforce Platform App Builder • Study Format "Distance Learning": Written Assessment: Project Report Project: Salesforce Platform Developer • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Project: Salesforce Platform App Builder

Using the learning platform Trailhead students will learn the fundamentals of Salesforce. At the end of the course, the students will be able to design, build and deploy custom applications. This course prepares them for the Salesforce Platform App Builder Certification.

Project: Salesforce Platform Developer

Using the learning platform Trailhead students will learn how to develop own applications, built from various parts of the Salesforce platform. At the end of the course they will be able to use Apex, Visualforce and basic Lightning components. This course prepares the students for the Salesforce Platform Developer I Certification.

Learning Outcomes

Project: Salesforce Platform App Builder

On successful completion, students will be able to

- define what Salesforce and customer relationship management is,
- design the data model, user interface, and business logic for custom applications,
- customize applications for mobile use,
- design reports and dashboards,
- manage application security and deploy custom applications.

Project: Salesforce Platform Developer

On successful completion, students will be able to

- develop own applications using Apex and basic Lightning components,
- write SOSL, SOQL and DML statements,
- use Visualforce to build custom user interfaces for mobile and web apps,
- build reusable, performant components that follow modern web standards,
- use the built-in testing framework to test Apex and Visualforce.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Marketing & Sales	All Bachelor Programs in the Marketing & Communication field

Project: Salesforce Platform App Builder

Course Code: DLSFPD01

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

Course Description

Salesforce is the most used software solution for customer relationship management worldwide. This solution can be customized and personalized for the needs of customers, partners and employees. Using the learning platform Trailhead, students will learn independently the fundamentals of Salesforce and the development of customized application. This course prepares students for the Salesforce Platform App Builder Certification.

Course Outcomes

On successful completion, students will be able to

- define what Salesforce and customer relationship management is,
- design the data model, user interface, and business logic for custom applications,
- customize applications for mobile use,
- design reports and dashboards,
- manage application security and deploy custom applications.

Contents

- The content on the learning platform focuses on the features and functionality to design, build and deploy custom applications. The content also provides knowledge to define business logic and process automation declaratively. Furthermore, the design and management of the correct data models and the customization of applications for individual needs is included in this course. Thus, the content of this course enables to automate repetitive tasks and to optimize processes in customer organizations.

Literature
Compulsory Reading
Further Reading ▪ Gupta, R. (2019): Salesforce Platform App Builder Certification. A Practical Study Guide. 1st ed., Apress. ▪ Weinmeister, P. (2019): Practical Salesforce Development Without Code. Building Declarative Solutions on the Salesforce Platform. 2nd ed., Apress, Berkeley. ▪ Shaalan, S. (2020): Salesforce for Beginners. A step-by-step guide to creating, managing, and automating sales and marketing processes. Packt Publishing, Birmingham. ▪ Benioff, M./Langley, M. (2019): Trailblazer. The Power of Business as the Greatest Platform for Change. 1st ed.

Study Format Distance Learning

Study Format	**Course Type**
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Project: Salesforce Platform Developer

Course Code: DLSFPD02

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

Course Description

The Salesforce platform not only forms the foundation of core Salesforce products like Sales Cloud and Service Cloud, but it is also possible to build own functionalities and own applications. Using the learning platform Trailhead, students will learn how to use the programmatic pillars of the Salesforce platform: Lightning components, Apex and Visualforce. This course prepares students for the Salesforce Platform Developer I Certification.

Course Outcomes

On successful completion, students will be able to

- develop own applications using Apex and basic Lightning components,
- write SOSL, SOQL and DML statements,
- use Visualforce to build custom user interfaces for mobile and web apps,
- build reusable, performant components that follow modern web standards,
- use the built-in testing framework to test Apex and Visualforce.

Contents

- The content on the learning platform focuses on the development of own functionality and own applications, built from various parts of the Salesforce platform. The content enables to use the programmatic elements Lightning components, Apex and Visualforce. Furthermore, knowledge is provided for data modeling, process automation, user interface design, testing and deployment. Thus, the content of this course enables to extend Salesforce by individual applications to cover the needs in customer organizations.

Literature

Compulsory Reading

Further Reading

- Salesforce (2020): Developer Documentation. (URL: https://developer.salesforce.com/docs/ [accessed: 12.12.2020])

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Mobile Software Engineering

Module Code: DLBCSEMSE

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. jan Rüterbories (Mobile Software Engineering) / Dr. Christian Remfert (Project: Mobile Software Engineering)

Contributing Courses to Module

- Mobile Software Engineering (DLBCSEMSE01)
- Project: Mobile Software Engineering (DLBCSEMSE02)

Module Exam Type	
Module Exam	**Split Exam** Mobile Software Engineering • Study Format "Distance Learning": Exam, 90 Minutes Project: Mobile Software Engineering • Study Format "Distance Learning": Written Assessment: Project Report

Weight of Module

see curriculum

Module Contents
Mobile Software Engineering ▪ Basics of mobile software development ▪ Android system architecture ▪ Development environment ▪ Core components of an Android app ▪ Interaction between application components ▪ Advanced techniques **Project: Mobile Software Engineering** Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task.

Learning Outcomes
Mobile Software Engineering On successful completion, students will be able to ▪ recognize the differences and peculiarities of software development for mobile systems and explain them. ▪ differentiate between different activities, roles, and risks in the creation, operation, and maintenance of mobile software systems. ▪ explain and differentiate between the architecture and technical features of the Android platform. ▪ independently create mobile software systems to solve concrete problems for the “Android” platform. **Project: Mobile Software Engineering** On successful completion, students will be able to ▪ independently design and create a prototype of a small mobile application to solve a specific problem. ▪ recognize typical problems and challenges in the practical implementation of small mobile applications. ▪ document the conception and implementation of small, independently designed and implemented mobile applications.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the fields of Computer Science & Software Development	All Bachelor Programs in the IT & Technology fields

Mobile Software Engineering

Course Code: DLBCSEMSE01

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

Course Description

Using the mobile platform "Android" as an example, it will be demonstrated how the programming of mobile applications (apps) differs from the development of browser-based information systems, which technologies and programming concepts are typically used, and which typical challenges there are in app development for industrial applications.

Course Outcomes

On successful completion, students will be able to

- recognize the differences and peculiarities of software development for mobile systems and explain them.
- differentiate between different activities, roles, and risks in the creation, operation, and maintenance of mobile software systems.
- explain and differentiate between the architecture and technical features of the Android platform.
- independently create mobile software systems to solve concrete problems for the “Android” platform.

Contents

1. Basics of Mobile Software Development
   - 1.1 Special Features of Mobile Devices
   - 1.2 Special Features of Mobile Software Development
   - 1.3 Classification of Mobile Devices
   - 1.4 The Android Platform
2. Android System Architecture
   - 2.1 The Android System
   - 2.2 Safety and Security
   - 2.3 Communication with Networks
3. Development Environment
   - 3.1 Android Studio
   - 3.2 First App and Emulator Test

3.3 Application Deployment

4. Core Components of an Android App
   4.1 Overview of the Components of an Android App
   4.2 Activities, Layouts, and Views
   4.3 Resources
   4.4 Summary in an App
   4.5 Graphic Design

5. Interaction Between Application Components
   5.1 Intents
   5.2 Services
   5.3 Broadcast Receiver

6. Advanced Techniques
   6.1 Threading
   6.2 Application Memory

Literature

Compulsory Reading

Further Reading

- Allen, G. (2021). Android for absolute beginners: Getting started with mobile apps development using the Android Java SDK. Apress.
- Boyer, R., & Mew, K. (2016). Android application development cookbook (2nd ed.). Packt Publishing.
- Collins, L., & Ellis, R. S. (2015). Mobile devices: Tools and technologies. CRC Press.
- Hagos, T. (2020): Learn Android Studio 4: Efficient Java-Based Android Apps Development. Berkeley, CA: Apress.
- Meike, B. G., & Schiefer, L. (2022). Inside the Android OS: Building, customizing, managing, and operating Android system services. Pearson.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Course Book ☑ Video ☑ Audio ☑ Slides	**Exam Preparation** ☑ Practice Exam ☑ Online Tests

Project: Mobile Software Engineering

Course Code: DLBCSEMSE02

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

Course Description

Using the knowledge gained in the course "Mobile Software Engineering using the Android platform as an example", students independently create a mobile application and document its conception and implementation.

Course Outcomes

On successful completion, students will be able to

- independently design and create a prototype of a small mobile application to solve a specific problem.
- recognize typical problems and challenges in the practical implementation of small mobile applications.
- document the conception and implementation of small, independently designed and implemented mobile applications.

Contents

- Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task. Possible topics are, for example:
- A radio app to improve the exchange between listeners and stations in general, and listeners and radio presenters in particular.
- An app that allows a group of board game fans to better organize their regular evening game.
- An app that theses supervisors at IUBH can use to improve their supervision processes.

Literature

Compulsory Reading

Further Reading

- Allen, G. (2021): Android for Absolute Beginners [electronic resource]: Getting Started with Mobile Apps Development Using the Android Java SDK. Berkeley, CA: Apress.
- Boyer, R. & Mew, K. (2016): Android Application Development Cookbook - Second Edition. Birmingham, UK : Packt Publishing.
- Hagos, T. (2020): Learn Android Studio 4: Efficient Java-Based Android Apps Development. Berkeley, CA: Apress.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Big Data and Cloud Technologies

Module Code: DLBCSEBDCT

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator
Prof. Dr. Christian Müller-Kett (Big Data Technologies) / Prof. Dr. Tianxiang Lu (Cloud Computing)

Contributing Courses to Module
▪ Big Data Technologies (DLBDSBDT01) ▪ Cloud Computing (DLBDSCC01)

Module Exam Type	
Module Exam	**Split Exam** Big Data Technologies • Study Format "Distance Learning": Exam, 90 Minutes Cloud Computing • Study Format "Distance Learning": Exam, 90 Minutes
Weight of Module see curriculum	

Module Contents

Big Data Technologies

- Data types and data sources
- Text-based and binary data formats
- Distributed systems
- Streaming frameworks
- NoSQL approach to data storage

Cloud Computing

- 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

Big Data Technologies

On successful completion, students will be able to

- name types and sources of data.
- understand text-based and binary data formats.
- analyze the requirements and constraints of distributed analysis systems.
- evaluate the applications of streaming frameworks.
- describe the motivation for NoSQL data stores and categorize pertaining established concepts.

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	**Links to other Study Programs of the University**
This module is similar to other modules in the field(s) of Computer Science & Software Developement.	All Bachelor Programmes in the IT & Technology field(s).

Big Data Technologies

Course Code: DLBDSBDT01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBCSDMDS01

Course Description

Data are often considered the “new oil”, the raw material from which value is created. To harness the power of data, the data need to be stored and processed on a technical level. This course introduces the four “Vs” of data, as well as typical data sources and types. The course discusses the most common data storage formats encountered in modern systems, focusing both on text-based as well as binary data formats.Handling large amounts of data poses significant challenges for the underlying infrastructure. The course discusses the most important distributed and streaming data handling frameworks which are used in leading edge applications.

Course Outcomes

On successful completion, students will be able to

- name types and sources of data.
- understand text-based and binary data formats.
- analyze the requirements and constraints of distributed analysis systems.
- evaluate the applications of streaming frameworks.
- describe the motivation for NoSQL data stores and categorize pertaining established concepts.

Contents

1. Data Types and Data Sources
   - 1.1 The 4Vs of data: volume, velocity, variety, veracity
   - 1.2 Data sources
   - 1.3 Data types
2. Working with Common Data Formats
   - 2.1 Text-Based Formats (CSV, XML, JSON)
   - 2.2 Binary Formats (HDF5, Parquet, Arrow)
3. NoSQL data stores
   - 3.1 Introduction and motivation
   - 3.2 Approaches and technical concepts
4. Distributed Systems

4.1 Hadoop & MapReduce
4.2 Hadoop file system (HDFS)
4.3 Spark
4.4 DASK

5. Streaming Frameworks
5.1 Spark streaming
5.2 Kafka

Literature

Compulsory Reading

Further Reading

- Kleppmann, M. (2017). Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems. O'Reilly.
- White, T. (2015). Hadoop: The definitive guide. O'Reilly.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Course Book ☑ Video ☑ Audio ☑ Slides	**Exam Preparation** ☑ Practice Exam ☑ Online Tests

Cloud Computing

Course Code: DLBDSCC01

Study Level	Language of Instruction and Examination	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 General Overview
   - 4.2 Google Cloud Platform
   - 4.3 Amazon Web Services
   - 4.4 Microsoft Azure
   - 4.5 Platform Comparison

5. Data Science in the Cloud
   - 5.1 Provider-independent services and tools
   - 5.2 Google Data Science and Machine Learning Services
   - 5.3 Amazon Web Services Data Science and Machine Learning Services
   - 5.4 Microsoft Azure Data Science and Machine Learning Services

Literature

Compulsory Reading

Further Reading

- Goessling, S., & Jackson, K. L. (2018). Architecting cloud computing solutions. Packt Publishing.
- Mahmood, Z., Puttini, R., & Erl, T. (2013). Cloud computing: Concepts, technology & architecture. Prentice Hall.
- Sehgal, N. K., & Bhatt, P. C. P. (2023). Cloud computing with security and scalability: Concepts and practices.
- Zonooz, P., Farr, E., Arora, K., & Laszewski, T. (2018). Cloud native architectures. Packt Publishing.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

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 and Examination
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Maik Drozdzynski (Business Intelligence) / Prof. Dr. Neil Arvin Bretana (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 ▪ Motivation and Conceptualization ▪ Data Provision ▪ Data Warehouse ▪ Modeling of Multidimensional Data Spaces ▪ Analysis Systems ▪ Distribution and Access **Project: Business Intelligence** Possible topics for the BI project include “Management of BI projects”, “Design of multidimensional data models” and “Prototypical implementation of small BI applications”.	
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 the University** All Bachelor Programmes in the IT & Technology fields

Business Intelligence

Course Code: DLBCSEBI01

Study Level	Language of Instruction and Examination	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

Literature

Compulsory Reading

Further Reading

- Grossmann, W., & Rinderle-Ma, S. (2015). Fundamentals of business intelligence. Springer.
- Sharda, R., Delen, D., & Turban, E. (2015). Business intelligence and analytics: Systems for decision support (10th ed.). Pearson.
- Sherman, R. (2014). Business intelligence guidebook: From data integration to analytics. Morgan Kaufmann.
- Vaisman, A., & Zimányi, E. (2022). Data warehouse systems: Design and implementation. Springer.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Course Book ☑ Video ☑ Slides	**Exam Preparation** ☑ Practice Exam ☑ Online Tests

Project: Business Intelligence

Course Code: DLBCSEBI02

Study Level	Language of Instruction and Examination	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 ▪ Liedtka, J. (2018). Why design thinking works. Harvard Business Review, 2018(9), 72–79. ▪ Meinel, C., & Leifer, L. J. (2021). Design thinking research: Interrogating the doing. Springer International Publishing. ▪ Meinel, C., Plattner, H., & Leifer, L. (2011). Design thinking: Understand – Improve – Apply. Springer Berlin Heidelberg.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Software Engineering with Python

Module Code: DLBCSESEWP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator

Prof. Dr. Max Pumperla (Project: Object Oriented and Functional Programming in Python) / Prof. Dr. Max Pumperla (Data Science Software Engineering)

Contributing Courses to Module

- Project: Object Oriented and Functional Programming in Python (DLBDSOOFPP01)
- Data Science Software Engineering (DLBDSDSSE01)

Module Exam Type

Module Exam	Split Exam
	Project: Object Oriented and Functional Programming in Python • Study Format "Distance Learning": Portfolio Data Science Software Engineering • Study Format "Distance Learning": Exam, 90 Minutes

Weight of Module

see curriculum

Module Contents

Project: Object Oriented and Functional Programming in Python

- 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.

Data Science Software Engineering

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

Learning Outcomes

Project: 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.

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	**Links to other Study Programs of the University**
This module is similar to other modules in the field(s) of Data Science & Artificial Intelligence.	All Bachelor Programmes in the IT & Technology field(s).

Project: Object Oriented and Functional Programming in Python

Course Code: DLBDSOOFPP01

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

Course Description

Students will build upon their foundational knowledge of Python programming, by exploring 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

- Students are being provided 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. ▪ Lutz, M. (2013). Learning Python (5th ed.). O'Reilly. ▪ 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. ▪ Ramalho, L. (2015). Fluent Python: Clear, concise, and effective programming. O'Reilly.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Portfolio

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Data Science Software Engineering

Course Code: DLBDSDSSE01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBDSIPWP01 and (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 trests
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

- Brookshear, G., & Brylow, D. (2019). Computer science: An overview. Pearson Education.
- Stephens, R. (2015). Beginning software engineering. John Wiley & Sons.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Course Book ☑ Video ☑ Slides	☑ Practice Exam ☑ Online Tests

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Johannes Kent Walter (IT Project Management) / Prof. Dr. Claudia Heß (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	Links to other Study Programs of the University
This module is similar to other modules in the field of Computer Science & Software Developement.	All Bachelor Programmes in the IT & Technology field.

IT Project Management

Course Code: DLBCSEITPAM01

Study Level	Language of Instruction and Examination	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

- Project Management Institute. (2021). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Seventh Edition and The Standard for Project Management (ENGLISH): Vol. Seventh edition. Project Management Institute.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint	**Learning Material** ☑ Course Book ☑ Video ☑ Audio ☑ Slides	**Exam Preparation** ☑ Practice Exam ☑ Online Tests

IT Architecture Management

Course Code: DLBCSEITPAM02

Study Level	Language of Instruction and Examination	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

- Ahlemann, F., Messerschmidt, M., Stettiner, E., & Legner, C. (2012). Strategic enterprise architecture management. Challenges, best practices, and future developments. Springer-Verlag.
- Perroud, T., & Inversini, R. (2013). Enterprise architecture patterns: Practical solutions for recurring IT-architecture problems. Springer.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Course Book ☑ Video ☑ Audio ☑ Slides	☑ Practice Exam ☑ Online Tests

Project: Salesforce Platform Management

Module Code: DLSFPM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Thomas Bolz (Project: Salesforce Fundamentals) / Prof. Dr. Thomas Bolz (Project: CRM with Salesforce Service Cloud)

Contributing Courses to Module

- Project: Salesforce Fundamentals (DLSFPM01)
- Project: CRM with Salesforce Service Cloud (DLSFPM02)

Module Exam Type

Module Exam	Split Exam
	Project: Salesforce Fundamentals • Study Format "Distance Learning": Written Assessment: Project Report Project: CRM with Salesforce Service Cloud • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Project: Salesforce Fundamentals

Using the learning platform trailhead students will learn the fundamentals of Salesforce. At the end of the course students will be able to administer the Salesforce platform. This module prepares them for the Salesforce administrator certification.

Project: CRM with Salesforce Service Cloud

Using the learning platform trailhead students will learn how to manage customer relationships with Salesforce platform. At the end of the course they will be able to manage the Salesforce service cloud. This module prepares students for the Salesforce service cloud certification.

Learning Outcomes

Project: Salesforce Fundamentals

On successful completion, students will be able to

- define what Salesforce and customer relationship management is.
- describe and compare the different options for importing and exporting data in Salesforce.
- create reports and visualize key business metrics in real-time in Salesforce.
- create a simple Salesforce app.
- control access to data using security tools in Salesforce.

Project: CRM with Salesforce Service Cloud

On successful completion, students will be able to

- set up customer service with Salesforce service cloud.
- lead a customer service team in the digital era.
- create digital engagement on multiple channels.
- define service cloud goals and metrics.
- automate case management.
- improve customer service using artificial intelligence.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the fields of Marketing & Sales	All Bachelor Programmes in the Marketing & Communication fields

Project: Salesforce Fundamentals

Course Code: DLSFPM01

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

Course Description

Salesforce is the most used software solution for customer relationship management worldwide. Using the learning platform trailhead students will learn independently the fundamentals of Salesforce. The course introduces Salesforce and explains how to administrate it. Additionally, it presents essentials of the Salesforce platform.

Course Outcomes

On successful completion, students will be able to

- define what Salesforce and customer relationship management is.
- describe and compare the different options for importing and exporting data in Salesforce.
- create reports and visualize key business metrics in real-time in Salesforce.
- create a simple Salesforce app.
- control access to data using security tools in Salesforce.

Contents

- The content on the learning platform focuses on the features and the functionality used to maintain a Salesforce implementation. It provides general knowledge of the features available to end users and the configuration options available to a Salesforce administrator. Furthermore, the content enables to maintain a Salesforce organization, respond to common business requirements, and perform administrative functions using current Salesforce features.

Literature

Compulsory Reading

Further Reading

- Eason, J. (2014): Android Studio 1.0. (URL: http://android-developers.blogspot.de/2014/12/android-studio-10.html [accessed: 22.04.2016]).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Project: CRM with Salesforce Service Cloud

Course Code: DLSFPM02

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

Course Description

This course facilitates key aspects of setting up customer service with Salesforce service cloud on the learning platform trailhead. The course describes how to implement Salesforce service cloud and manage it. It enables to make better business decisions based on customer service data and to create a service metrics strategy. The course shows how to create processes to help support teams become more efficient and manage large data volumes within Salesforce and prepares students for the Salesforce service cloud certification.

Course Outcomes

On successful completion, students will be able to

- set up customer service with Salesforce service cloud.
- lead a customer service team in the digital era.
- create digital engagement on multiple channels.
- define service cloud goals and metrics.
- automate case management.
- improve customer service using artificial intelligence.

Contents

- The content on the learning platform focuses on designing and deploying solutions that support customer business processes and requirements using Salesforce applications. The content enables to design solutions using the Service Cloud functionality and to lead the implementation of these solutions within a customer organization.

Literature

Compulsory Reading

Further Reading

- Eason, J. (2014): Android Studio 1.0. (URL: http://android-developers.blogspot.de/2014/12/android-studio-10.html [accessed: 22.04.2016]).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Salesforce Platform Development

Module Code: DLSFPD

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Thomas Bolz (Project: Salesforce Platform App Builder) / Prof. Dr. Thomas Bolz (Project: Salesforce Platform Developer)

Contributing Courses to Module
▪ Project: Salesforce Platform App Builder (DLSFPD01) ▪ Project: Salesforce Platform Developer (DLSFPD02)

Module Exam Type	
Module Exam	**Split Exam** <u>Project: Salesforce Platform App Builder</u> • Study Format "Distance Learning": Written Assessment: Project Report <u>Project: Salesforce Platform Developer</u> • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Project: Salesforce Platform App Builder

Using the learning platform Trailhead students will learn the fundamentals of Salesforce. At the end of the course, the students will be able to design, build and deploy custom applications. This course prepares them for the Salesforce Platform App Builder Certification.

Project: Salesforce Platform Developer

Using the learning platform Trailhead students will learn how to develop own applications, built from various parts of the Salesforce platform. At the end of the course they will be able to use Apex, Visualforce and basic Lightning components. This course prepares the students for the Salesforce Platform Developer I Certification.

Learning Outcomes

Project: Salesforce Platform App Builder

On successful completion, students will be able to

- define what Salesforce and customer relationship management is,
- design the data model, user interface, and business logic for custom applications,
- customize applications for mobile use,
- design reports and dashboards,
- manage application security and deploy custom applications.

Project: Salesforce Platform Developer

On successful completion, students will be able to

- develop own applications using Apex and basic Lightning components,
- write SOSL, SOQL and DML statements,
- use Visualforce to build custom user interfaces for mobile and web apps,
- build reusable, performant components that follow modern web standards,
- use the built-in testing framework to test Apex and Visualforce.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Marketing & Sales	All Bachelor Programs in the Marketing & Communication field

Project: Salesforce Platform App Builder

Course Code: DLSFPD01

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

Course Description
Salesforce is the most used software solution for customer relationship management worldwide. This solution can be customized and personalized for the needs of customers, partners and employees. Using the learning platform Trailhead, students will learn independently the fundamentals of Salesforce and the development of customized application. This course prepares students for the Salesforce Platform App Builder Certification.

Course Outcomes

On successful completion, students will be able to

- define what Salesforce and customer relationship management is,
- design the data model, user interface, and business logic for custom applications,
- customize applications for mobile use,
- design reports and dashboards,
- manage application security and deploy custom applications.

Contents

- The content on the learning platform focuses on the features and functionality to design, build and deploy custom applications. The content also provides knowledge to define business logic and process automation declaratively. Furthermore, the design and management of the correct data models and the customization of applications for individual needs is included in this course. Thus, the content of this course enables to automate repetitive tasks and to optimize processes in customer organizations.

Literature
Compulsory Reading
Further Reading ▪ Gupta, R. (2019): Salesforce Platform App Builder Certification. A Practical Study Guide. 1st ed., Apress. ▪ Weinmeister, P. (2019): Practical Salesforce Development Without Code. Building Declarative Solutions on the Salesforce Platform. 2nd ed., Apress, Berkeley. ▪ Shaalan, S. (2020): Salesforce for Beginners. A step-by-step guide to creating, managing, and automating sales and marketing processes. Packt Publishing, Birmingham. ▪ Benioff, M./Langley, M. (2019): Trailblazer. The Power of Business as the Greatest Platform for Change. 1st ed.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Project: Salesforce Platform Developer

Course Code: DLSFPD02

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

Course Description

The Salesforce platform not only forms the foundation of core Salesforce products like Sales Cloud and Service Cloud, but it is also possible to build own functionalities and own applications. Using the learning platform Trailhead, students will learn how to use the programmatic pillars of the Salesforce platform: Lightning components, Apex and Visualforce. This course prepares students for the Salesforce Platform Developer I Certification.

Course Outcomes

On successful completion, students will be able to

- develop own applications using Apex and basic Lightning components,
- write SOSL, SOQL and DML statements,
- use Visualforce to build custom user interfaces for mobile and web apps,
- build reusable, performant components that follow modern web standards,
- use the built-in testing framework to test Apex and Visualforce.

Contents

- The content on the learning platform focuses on the development of own functionality and own applications, built from various parts of the Salesforce platform. The content enables to use the programmatic elements Lightning components, Apex and Visualforce. Furthermore, knowledge is provided for data modeling, process automation, user interface design, testing and deployment. Thus, the content of this course enables to extend Salesforce by individual applications to cover the needs in customer organizations.

Literature

Compulsory Reading

Further Reading

- Salesforce (2020): Developer Documentation. (URL: https://developer.salesforce.com/docs/ [accessed: 12.12.2020])

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Mobile Software Engineering

Module Code: DLBCSEMSE

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. jan Rüterbories (Mobile Software Engineering) / Dr. Christian Remfert (Project: Mobile Software Engineering)

Contributing Courses to Module
▪ Mobile Software Engineering (DLBCSEMSE01) ▪ Project: Mobile Software Engineering (DLBCSEMSE02)

Module Exam Type	
Module Exam	**Split Exam** Mobile Software Engineering • Study Format "Distance Learning": Exam, 90 Minutes Project: Mobile Software Engineering • Study Format "Distance Learning": Written Assessment: Project Report
Weight of Module see curriculum	

Module Contents	
Mobile Software Engineering ▪ Basics of mobile software development ▪ Android system architecture ▪ Development environment ▪ Core components of an Android app ▪ Interaction between application components ▪ Advanced techniques **Project: Mobile Software Engineering** Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task.	
Learning Outcomes **Mobile Software Engineering** On successful completion, students will be able to ▪ recognize the differences and peculiarities of software development for mobile systems and explain them. ▪ differentiate between different activities, roles, and risks in the creation, operation, and maintenance of mobile software systems. ▪ explain and differentiate between the architecture and technical features of the Android platform. ▪ independently create mobile software systems to solve concrete problems for the "Android" platform. **Project: Mobile Software Engineering** On successful completion, students will be able to ▪ independently design and create a prototype of a small mobile application to solve a specific problem. ▪ recognize typical problems and challenges in the practical implementation of small mobile applications. ▪ document the conception and implementation of small, independently designed and implemented mobile applications.	
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 the University** All Bachelor Programs in the IT & Technology fields

Mobile Software Engineering

Course Code: DLBCSEMSE01

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

Course Description

Using the mobile platform "Android" as an example, it will be demonstrated how the programming of mobile applications (apps) differs from the development of browser-based information systems, which technologies and programming concepts are typically used, and which typical challenges there are in app development for industrial applications.

Course Outcomes

On successful completion, students will be able to

- recognize the differences and peculiarities of software development for mobile systems and explain them.
- differentiate between different activities, roles, and risks in the creation, operation, and maintenance of mobile software systems.
- explain and differentiate between the architecture and technical features of the Android platform.
- independently create mobile software systems to solve concrete problems for the “Android” platform.

Contents

1. Basics of Mobile Software Development
   - 1.1 Special Features of Mobile Devices
   - 1.2 Special Features of Mobile Software Development
   - 1.3 Classification of Mobile Devices
   - 1.4 The Android Platform

2. Android System Architecture
   - 2.1 The Android System
   - 2.2 Safety and Security
   - 2.3 Communication with Networks

3. Development Environment
   - 3.1 Android Studio
   - 3.2 First App and Emulator Test

Literature

Compulsory Reading

Further Reading

- Allen, G. (2021). Android for absolute beginners: Getting started with mobile apps development using the Android Java SDK. Apress.
- Boyer, R., & Mew, K. (2016). Android application development cookbook (2nd ed.). Packt Publishing.
- Collins, L., & Ellis, R. S. (2015). Mobile devices: Tools and technologies. CRC Press.
- Hagos, T. (2020): Learn Android Studio 4: Efficient Java-Based Android Apps Development. Berkeley, CA: Apress.
- Meike, B. G., & Schiefer, L. (2022). Inside the Android OS: Building, customizing, managing, and operating Android system services. Pearson.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Project: Mobile Software Engineering

Course Code: DLBCSEMSE02

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

Course Description

Using the knowledge gained in the course "Mobile Software Engineering using the Android platform as an example", students independently create a mobile application and document its conception and implementation.

Course Outcomes

On successful completion, students will be able to

- independently design and create a prototype of a small mobile application to solve a specific problem.
- recognize typical problems and challenges in the practical implementation of small mobile applications.
- document the conception and implementation of small, independently designed and implemented mobile applications.

Contents

- Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task. Possible topics are, for example:
- A radio app to improve the exchange between listeners and stations in general, and listeners and radio presenters in particular.
- An app that allows a group of board game fans to better organize their regular evening game.
- An app that theses supervisors at IUBH can use to improve their supervision processes.

Literature

Compulsory Reading

Further Reading

- Allen, G. (2021): Android for Absolute Beginners [electronic resource]: Getting Started with Mobile Apps Development Using the Android Java SDK. Berkeley, CA: Apress.
- Boyer, R. & Mew, K. (2016): Android Application Development Cookbook - Second Edition. Birmingham, UK : Packt Publishing.
- Hagos, T. (2020): Learn Android Studio 4: Efficient Java-Based Android Apps Development. Berkeley, CA: Apress.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Big Data and Cloud Technologies

Module Code: DLBCSEBDCT

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator
Prof. Dr. Christian Müller-Kett (Big Data Technologies) / Prof. Dr. Tianxiang Lu (Cloud Computing)

Contributing Courses to Module
▪ Big Data Technologies (DLBDSBDT01) ▪ Cloud Computing (DLBDSCC01)

Module Exam Type	
Module Exam	**Split Exam** Big Data Technologies • Study Format "Distance Learning": Exam, 90 Minutes Cloud Computing • Study Format "Distance Learning": Exam, 90 Minutes
Weight of Module see curriculum	

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Module Contents

Big Data Technologies

- Data types and data sources
- Text-based and binary data formats
- Distributed systems
- Streaming frameworks
- NoSQL approach to data storage

Cloud Computing

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

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Learning Outcomes

Big Data Technologies

On successful completion, students will be able to

- name types and sources of data.
- understand text-based and binary data formats.
- analyze the requirements and constraints of distributed analysis systems.
- evaluate the applications of streaming frameworks.
- describe the motivation for NoSQL data stores and categorize pertaining established concepts.

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

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Links to other Modules within the Study Program

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

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Links to other Study Programs of the University

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

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Big Data Technologies

Course Code: DLBDSBDT01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBCSDMDS01

Course Description

Data are often considered the “new oil”, the raw material from which value is created. To harness the power of data, the data need to be stored and processed on a technical level. This course introduces the four “Vs” of data, as well as typical data sources and types. The course discusses the most common data storage formats encountered in modern systems, focusing both on text-based as well as binary data formats.Handling large amounts of data poses significant challenges for the underlying infrastructure. The course discusses the most important distributed and streaming data handling frameworks which are used in leading edge applications.

Course Outcomes

On successful completion, students will be able to

- name types and sources of data.
- understand text-based and binary data formats.
- analyze the requirements and constraints of distributed analysis systems.
- evaluate the applications of streaming frameworks.
- describe the motivation for NoSQL data stores and categorize pertaining established concepts.

Contents

1. Data Types and Data Sources
   - 1.1 The 4Vs of data: volume, velocity, variety, veracity
   - 1.2 Data sources
   - 1.3 Data types

2. Working with Common Data Formats
   - 2.1 Text-Based Formats (CSV, XML, JSON)
   - 2.2 Binary Formats (HDF5, Parquet, Arrow)

3. NoSQL data stores
   - 3.1 Introduction and motivation
   - 3.2 Approaches and technical concepts

4. Distributed Systems

4.1 Hadoop & MapReduce
4.2 Hadoop file system (HDFS)
4.3 Spark
4.4 DASK

5. Streaming Frameworks
5.1 Spark streaming
5.2 Kafka

Literature
Compulsory Reading
Further Reading

- Kleppmann, M. (2017). Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems. O'Reilly.
- White, T. (2015). Hadoop: The definitive guide. O'Reilly.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Cloud Computing

Course Code: DLBDSCC01

Study Level	Language of Instruction and Examination	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 General Overview
    - 4.2 Google Cloud Platform
    - 4.3 Amazon Web Services
    - 4.4 Microsoft Azure
    - 4.5 Platform Comparison

5. Data Science in the Cloud
    - 5.1 Provider-independent services and tools
    - 5.2 Google Data Science and Machine Learning Services
    - 5.3 Amazon Web Services Data Science and Machine Learning Services
    - 5.4 Microsoft Azure Data Science and Machine Learning Services

Literature

Compulsory Reading

Further Reading

- Goessling, S., & Jackson, K. L. (2018). Architecting cloud computing solutions. Packt Publishing.
- Mahmood, Z., Puttini, R., & Erl, T. (2013). Cloud computing: Concepts, technology & architecture. Prentice Hall.
- Sehgal, N. K., & Bhatt, P. C. P. (2023). Cloud computing with security and scalability: Concepts and practices.
- Zonooz, P., Farr, E., Arora, K., & Laszewski, T. (2018). Cloud native architectures. Packt Publishing.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Ses-sions/Learning Sprint ☑ Recorded Live Sessions	☑ Course Book ☑ Video ☑ Audio ☑ Slides	☑ Practice Exam ☑ Online Tests

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 and Examination
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Maik Drozdzynski (Business Intelligence) / Prof. Dr. Neil Arvin Bretana (Project: Business Intelligence)

Contributing Courses to Module
▪ Business Intelligence (DLBCSEBI01) ▪ Project: Business Intelligence (DLBCSEBI02)

Module Exam Type	
Module Exam	**Split Exam** <u>Business Intelligence</u> • Study Format "Distance Learning": Exam, 90 Minutes <u>Project: Business Intelligence</u> • Study Format "Distance Learning": Written Assessment: Project Report
Weight of Module see curriculum	

Module Contents **Business Intelligence** ▪ Motivation and Conceptualization ▪ Data Provision ▪ Data Warehouse ▪ Modeling of Multidimensional Data Spaces ▪ Analysis Systems ▪ Distribution and Access **Project: Business Intelligence** Possible topics for the BI project include “Management of BI projects”, “Design of multidimensional data models” and “Prototypical implementation of small BI applications”.
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	**Links to other Study Programs of the University**
This module is similar to other modules in the fields of Computer Science & Software Development	All Bachelor Programmes in the IT & Technology fields

Business Intelligence

Course Code: DLBCSEBI01

Study Level	Language of Instruction and Examination	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

Literature

Compulsory Reading

Further Reading

- Grossmann, W., & Rinderle-Ma, S. (2015). Fundamentals of business intelligence. Springer.
- Sharda, R., Delen, D., & Turban, E. (2015). Business intelligence and analytics: Systems for decision support (10th ed.). Pearson.
- Sherman, R. (2014). Business intelligence guidebook: From data integration to analytics. Morgan Kaufmann.
- Vaisman, A., & Zimányi, E. (2022). Data warehouse systems: Design and implementation. Springer.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Course Book ☑ Video ☑ Slides	☑ Practice Exam ☑ Online Tests

Project: Business Intelligence

Course Code: DLBCSEBI02

Study Level	Language of Instruction and Examination	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

- Liedtka, J. (2018). Why design thinking works. Harvard Business Review, 2018(9), 72–79.
- Meinel, C., & Leifer, L. J. (2021). Design thinking research: Interrogating the doing. Springer International Publishing.
- Meinel, C., Plattner, H., & Leifer, L. (2011). Design thinking: Understand – Improve – Apply. Springer Berlin Heidelberg.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Software Engineering with Python

Module Code: DLBCSESEWP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator

Prof. Dr. Max Pumperla (Project: Object Oriented and Functional Programming in Python) / Prof. Dr. Max Pumperla (Data Science Software Engineering)

Contributing Courses to Module

- Project: Object Oriented and Functional Programming in Python (DLBDSOOFPP01)
- Data Science Software Engineering (DLBDSDSSE01)

Module Exam Type

Module Exam	Split Exam
	Project: Object Oriented and Functional Programming in Python • Study Format "Distance Learning": Portfolio Data Science Software Engineering • Study Format "Distance Learning": Exam, 90 Minutes

Weight of Module

see curriculum

Module Contents
Project: Object Oriented and Functional Programming in Python ▪ 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. **Data Science Software Engineering** ▪ Traditional project management ▪ Agile project management ▪ Testing ▪ Software development paradigms ▪ From model to production

Learning Outcomes
Project: 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. **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	Links to other Study Programs of the University
This module is similar to other modules in the field(s) of Data Science & Artificial Intelligence.	All Bachelor Programmes in the IT & Technology field(s).

Project: Object Oriented and Functional Programming in Python

Course Code: DLBDSOOFPP01

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

Course Description

Students will build upon their foundational knowledge of Python programming, by exploring 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

- Students are being provided 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. ▪ Lutz, M. (2013). Learning Python (5th ed.). O'Reilly. ▪ 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. ▪ Ramalho, L. (2015). Fluent Python: Clear, concise, and effective programming. O'Reilly.

Study Format Distance Learning

Study Format	**Course Type**
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Portfolio

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Data Science Software Engineering

Course Code: DLBDSDSSE01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBDSIPWP01 and (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 trests
- 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

- Brookshear, G., & Brylow, D. (2019). Computer science: An overview. Pearson Education.
- Stephens, R. (2015). Beginning software engineering. John Wiley & Sons.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Slides	

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Johannes Kent Walter (IT Project Management) / Prof. Dr. Claudia Heß (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	Links to other Study Programs of the University
This module is similar to other modules in the field of Computer Science & Software Developement.	All Bachelor Programmes in the IT & Technology field.

IT Project Management

Course Code: DLBCSEITPAM01

Study Level	Language of Instruction and Examination	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

- Project Management Institute. (2021). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Seventh Edition and The Standard for Project Management (ENGLISH): Vol. Seventh edition. Project Management Institute.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint	**Learning Material** ☑ Course Book ☑ Video ☑ Audio ☑ Slides	**Exam Preparation** ☑ Practice Exam ☑ Online Tests

IT Architecture Management

Course Code: DLBCSEITPAM02

Study Level	Language of Instruction and Examination	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

- Ahlemann, F., Messerschmidt, M., Stettiner, E., & Legner, C. (2012). Strategic enterprise architecture management. Challenges, best practices, and future developments. Springer-Verlag.
- Perroud, T., & Inversini, R. (2013). Enterprise architecture patterns: Practical solutions for recurring IT-architecture problems. Springer.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Mastering Prompts

Module Code: DLBWMP_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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Kristina Schaaff (Artificial Intelligence) / Prof. Dr. Knut Linke (Project: AI Excellence with Creative Prompting Techniques)

Contributing Courses to Module

- Artificial Intelligence (DLBDSEAIS01)
- Project: AI Excellence with Creative Prompting Techniques (DLBPKIEKPT01_E)

Module Exam Type

Module Exam	Split Exam
	Artificial Intelligence • Study Format "Distance Learning": Exam, 90 Minutes Project: AI Excellence with Creative Prompting Techniques • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Artificial Intelligence

Project: AI Excellence with Creative Prompting Techniques

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.

Project: AI Excellence with Creative Prompting Techniques

On successful completion, students will be able to

- comprehend and apply basic prompting techniques in generative AI applications.
- analyze and evaluate the effectiveness of the basic prompts.
- apply ethical considerations to the design and use of AI for basic prompting techniques.
- design, implement, and refine effective prompts to real-world scenarios through hands-on exercises.
- showcase creative and innovative thinking in the application of prompting techniques to solve complex problems in their field of studies.

Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Data Science & Artificial Intelligence	All Bachelor Programs in the IT & Technology field

Artificial Intelligence

Course Code: DLBDSEAIS01

Study Level	Language of Instruction and Examination	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

Literature

Compulsory Reading

Further Reading

- Bear, F., Barry, W., & Paradiso, M. (2020). Neuroscience: Exploring the brain (4th ed.). Lippincott Williams & Wilkins.
- Chollet, F. (2018). Deep learning with Python. Manning.
- Géron, A. (2017). Hands-on machine learning with Scikit-Learn and TensorFlow. O'Reilly.
- Géron, A. (2019). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools, and techniques to build intelligent systems (2nd ed.). O'Reilly.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning. MIT Press.
- Grus, J. (2019). Data science from scratch: First principles with Python. O'Reilly.
- Jurafsky, D., & Martin, J. H. (2022). Speech and language processing (3rd ed.). Prentice Hall.
- Russell, S. J., & Norvig, P. (2022). Artificial Intelligence: A modern approach (4th ed., global ed.). Pearson.
- Sutton, R. S., & Barto, A. G. (2018). Reinforcement learning: An introduction (2nd ed.). MIT Press. (Adaptive Computation and Machine Learning series).
- Szeliski, R. (2022). Computer vision: Algorithms and applications (2nd ed.). Springer. (Texts in Computer Science series).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Project: AI Excellence with Creative Prompting Techniques

Course Code: DLBPKIEKPT01_E

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

Course Description
In this course, students explore the fascinating world of prompting in generative AI applications. They engage in hands-on exercises to create new AI-generated content including text, images, and videos. Through these exercises, students learn how to effectively use, analyze, and evaluate these systems within their respective fields of study.

Course Outcomes

On successful completion, students will be able to

- comprehend and apply basic prompting techniques in generative AI applications.
- analyze and evaluate the effectiveness of the basic prompts.
- apply ethical considerations to the design and use of AI for basic prompting techniques.
- design, implement, and refine effective prompts to real-world scenarios through hands-on exercises.
- showcase creative and innovative thinking in the application of prompting techniques to solve complex problems in their field of studies.

Contents

- In this course, students work on a basic practical implementation of a generative AI use case by choosing from a selection provided in the complementary guideline. The course provides practical examples as learning materials and exercises with basic prompting techniques for open-source text, image, and video generation use cases. The exercises are designed to inspire and guide students in completing their own generative AI use case work, which includes a use case description, chosen prompting techniques, outcomes, and critical evaluations from both technical and ethical perspectives.

Literature
Compulsory Reading
Further Reading ▪ Dang, H., Mecke, L., Lehmann, F., Goller, S., & Buschek, D. (2022). How to prompt? Opportunities and challenges of zero- and few-shot learning for human-AI interaction in creative applications of generative models. arXiv. https://arxiv.org/pdf/2209.01390.pdf ▪ Eapen, T. T., Finkenstadt, D. J., Folk, J., & Venkataswamy, L. (2023). How generative AI can augment human creativity. Harvard Business Review, July–August, 56–64. ▪ Wei, J., Wang, X., Schuurmans, D., Bosma, M. Ichter, B., Xia, F., Chi, E. H., Le., Q. V., & Zhou, D. (2023). Chain-of-though prompting elicit reasoning in large language models. arXiv. https://arxiv.org/pdf/2201.11903.pdf

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Career Development

Module Code: DLBKAENT_E

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator
Prof. Dr. Annette Strauß (Personal Career Plan) / Prof. Dr. Heike Schiebeck (Personal Elevator Pitch)

Contributing Courses to Module
▪ Personal Career Plan (DLBKAENT01_E) ▪ Personal Elevator Pitch (DLBKAENT02_E)

Module Exam Type	
Module Exam	**Split Exam** Personal Career Plan • Study Format "Distance Learning": Advanced Workbook Personal Elevator Pitch • Study Format "Distance Learning": Concept Presentation

Weight of Module
see curriculum

Module Contents

Personal Career Plan

- Career Theories and Models
- Career Development
- Choosing Possible Careers
- Personal Branding
- Career Strategy
- Global Careers
- Employment Search

Personal Elevator Pitch

Through the application of self-reflection, self-awareness based on relevant career success parameters students should develop career goals, career stages, and their career strategy. Taking into account their current professional and/or study situation, the central elements of a short-, and medium-term career planning are worked out by the students for their individual case. At the end of the course, students will be able to present their personal elevator pitch and communicate it in a proper way that is appropriate for the target group or audience. In this way, they will reflect on their current professional situation. The personal elevator pitch, being at hear of personal branding, supports the conveyance of this vision during personal networking activities.

Learning Outcomes

Personal Career Plan

On successful completion, students will be able to

- understand, apply, and reflect presented career theory and models with regard to their personal situation to arrive at a concept or pictore of a desired career.
- understand and critically reflect the concept of career and career planning.
- understand the relevance of a strategically oriented career planning.
- understand the importance of and conduct a personal assessment to identify one's personality, values, motivation, strengths, competencies, skills, and interests.
- understand the necessity of building and maintaining their own personal brand.
- understand differing job search processes across national/international contexts, and to create context-sensitive job applications accordingly.
- understand the principles of global careers and how to effectively act in international environments.

Personal Elevator Pitch

On successful completion, students will be able to

- identify their career goals, career stages, and the personal status quo with regard to their achievement.
- reflect their current situation and define where they want to aim.
- develop a career strategy by creating personal career goals and a coherent action plan.
- understand and apply the process of building a personal brand.
- define their identity, skills, profession, reasons to believe and necessary investments.
- identify their personal strengths and their core driver.
- understand the power of effective communication, networking, and storytelling.
- understand the principles and apply the process of designing a strong personal elevator pitch.
- critically reflect and adapt their personal elevator pitch to the specificities of the context, audience, target group, and way of delivery.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Human Resources	All Bachelor Programs in the Human Resources field

Personal Career Plan

Course Code: DLBKAENT01_E

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

Course Description

In today's complex and ever-changing environment, the forms of careers vary depending on the context, understanding of values, and market dynamics. The 'classic career ladder' that one is climbing being the only predominant form of career is long outdated, and individuals are being confronted with a great number of opportunities regarding industry or job choice and working arrangements.Considering the great variety of options especially for well-educated individuals, has become more important than ever to make informed decisions. This course is designed to support students maneauvering themselves through these complexities of their personal career plan, whereby self-awareness, self-reflection, and goal-setting are important elements of this process. Guided by central elements of career theory, career models, and research outcomes, students will be given tools and reflection exercises to arrive at a solid, directly applicable strategy to further steet their professional progress and career steps.

Course Outcomes

On successful completion, students will be able to

- understand, apply, and reflect presented career theory and models with regard to their personal situation to arrive at a concept or pictore of a desired career.
- understand and critically reflect the concept of career and career planning.
- understand the relevance of a strategically oriented career planning.
- understand the importance of and conduct a personal assessment to identify one's personality, values, motivation, strengths, competencies, skills, and interests.
- understand the necessity of building and maintaining their own personal brand.
- understand differing job search processes across national/international contexts, and to create context-sensitive job applications accordingly.
- understand the principles of global careers and how to effectively act in international environments.

Contents

1. Career Theories and Approaches
   - 1.1 Traditional Career Theories and Models
   - 1.2 Protean Career Orientation
   - 1.3 Career Learning Cycle

2. Career Development

2.1 Career Motives
2.2 Career Roles
2.3 Career Performance

3. Career Planning
   3.1 Essentials of Career Planning
   3.2 The Career Planning Process
   3.3 Contingencies of Career Planning

4. Personal Assessment
   4.1 Personality
   4.2 Values and Motivation
   4.3 Competencies, Skills, Strengths, and Fields of Interest

5. Career Choice
   5.1 Possible Career Paths
   5.2 Forms of Careers
   5.3 Employability
   5.4 Career Identity

6. Develop a Career Strategy and Manage your Career
   6.1 Career Capital
   6.2 Career Goals
   6.3 Career Success
   6.4 Personal Reflection
   6.5 Personal Branding

7. Global Careers
   7.1 Forms of Global Careers
   7.2 Individual Characteristics of Global Leaders
   7.3 Role of Interculturality
   7.4 Diversity and Inclusion

8. Search for Employment in Germany and Abroad
   8.1 Job Search Databases
   8.2 Networks and Platforms
   8.3 Shaping Resume and Cover Letter
   8.4 Written and Video Application
   8.5 Selection Procedures

Literature
Compulsory Reading
Further Reading ▪ Baruch, Y. (2022). Managing Careers and Employability. SAGE. ▪ Greenhaus, J.H., Callanan, G.A., & Godshalk, V.M. (2018). Career Management for Life (5th edition). College of Business & Public Management Faculty Books. ▪ Hoeckstra, H. (2011). A career roles model of career development. Journal of Vocational Behavior, 78(2), 159-173. ▪ Ibarra, H. (2004). Working Identity: Unconventional Strategies for Reinventing Your Career. Harvard Business School Press. ▪ Kingsley, T. (2022). Personal Branding. Independently published. ▪ Ng, T.W.H., Eby, L.T., Sorensen, K.L., & Feldman, D.C. (2005). Predictors of objective and subjective career success: A meta-analysis. Personnel psychology, 58(2), 367-408. ▪ Ng, T.W.H., & Feldman, D.C. (2014). Subjective career success: A meta-analytic review. Journal of Vocational Behavior, 85(2), 169-179.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Advanced Workbook

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
110 h	0 h	20 h	20 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Course Book ☑ Video ☑ Slides	**Exam Preparation** ☑ Online Tests ☑ Guideline

Personal Elevator Pitch

Course Code: DLBKAENT02_E

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	DLBKAENT01_E

Course Description

The forms of careers vary depending on the context or personal preferences in today's ever-changing, demanding, and complex environment. Changes in the environment, as for example technology, sustainability, and the rise of artificial intelligence, push individuals to take career transitions into their own hands. Personal endeavors to develop one's career through the acquisition of, for instance, new projects, jobs, or employers, require the right strategies to be successful. Contacts through targeted networking and the development of one's own brand play a special role here. Evenly so for individuals starting their careers after having accomplished their education, effective networking is key to career entry and development in these turbulent times. In addition, personal branding is a concept that not only has gained relevance in research but is also widely used in career counseling. Developing and conveying a personal brand is central to this course. Using the personal branding approach during networking activities, individuals can actively contribute to their career success.

Course Outcomes

On successful completion, students will be able to

- identify their career goals, career stages, and the personal status quo with regard to their achievement.
- reflect their current situation and define where they want to aim.
- develop a career strategy by creating personal career goals and a coherent action plan.
- understand and apply the process of building a personal brand.
- define their identity, skills, profession, reasons to believe and necessary investments.
- identify their personal strengths and their core driver.
- understand the power of effective communication, networking, and storytelling.
- understand the principles and apply the process of designing a strong personal elevator pitch.
- critically reflect and adapt their personal elevator pitch to the specificities of the context, audience, target group, and way of delivery.

Contents

- The core element of this course is a personal elevator pitch with the use of a personal branding canvas. The creation of a personal brand is not only relevant for self-employed freelancers or entrepreneurs but is as well helpful for individuals who strive for their own further development on the career ladder within their organization or for those who

are seeking employment. Having understood the characteristics of and reasoning behind personal branding and the underlying process, students will be able to apply this process to their own person and situation. ▪ Self-awareness being the main 'ingredient' for an effective personal brand, students will be encouraged to go on an intensive self-reflection journey to deepen their understanding of their identity, skills, profession, and reasons to believe for a personal brand, and subsequently, for a personal elevator pitch. ▪ Being at the heart of and the essence of personal branding, the elevator pitch enables individuals to impactfully present themselves in a nutshell to important individuals and potential employers. Having understood the principles and key success factors characterizing an elevator pitch, students will be able to develop their own one. They will learn to consider aspects like timing, benefit, clear positioning, target audience through an oral form of delivery. In addition, the role of communication, networking and storytelling principles will be highlighted. ▪ Knowledge of the core elements and success factors of the personal elevator pitch within the framework of the individual career development.

Literature
Compulsory Reading
Further Reading ▪ Dowling, D. (2009). How to Perfect an Elevator Pitch About Yourself. Harvard Business Review. https://hbr.org/2009/05/how-to-perfect-an-elevator-pit. ▪ Gorbatov, S., Khapova, S.N., & Lysova, E.I. (2018). Personal branding: Interdisciplinary systematic review and research agenda. Frontiers in psychology, 2238. ▪ Gorbatov, S., Khapova, S.N., & Lysova, E.I. (2019). Get noticed to get ahead: The impact of personal branding on career success. Frontiers in psychology, 2662. ▪ Jourdan Jr., Louis F., Deis, M., & Lysova, E.I. (2010). Getting Your Elevator Pitch To The Plate. Business Journal for Entrepreneurs, 2010(1), 43-47. ▪ Woodside, A.G. (2010). Brand consumer storytelling theory and research: Introduction to a Psychology & Marketing special issue. Psychology & Marketing, 27(6), 531-540.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Concept Presentation

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Studium Generale I and II

Module Code: DLBSG_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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

N.N. (Studium Generale I) / N.N. (Studium Generale II)

Contributing Courses to Module

- Studium Generale I (DLBSG01_E)
- Studium Generale II (DLBSG02_E)

Module Exam Type

Module Exam	Split Exam
	Studium Generale I • Study Format "Distance Learning": See Selected Course Studium Generale II • Study Format "Distance Learning": See Selected Course

Weight of Module

see curriculum

Module Contents
Studium Generale I In principle, all IU bachelor courses can be selected as courses for the "Studium Generale", so that the content can be chosen from the entire breadth of the IU distance learning program. **Studium Generale II** In principle, all IU bachelor courses can be selected as courses for the "Studium Generale", so that the content can be chosen from the entire breadth of the IU distance learning program.

Learning Outcomes
Studium Generale I On successful completion, students will be able to ▪ apply acquired key competencies to issues in their field of study and/or in their professional environment. ▪ to deepen one's own skills and abilities in a self-directed manner. ▪ to look beyond the boundaries of their own area of expertise. **Studium Generale II** On successful completion, students will be able to ▪ apply acquired key competencies to issues in their field of study and/or in their professional environment. ▪ to deepen one's own skills and abilities in a self-directed manner. ▪ to look beyond the boundaries of their own area of expertise.

Links to other Modules within the Study Program	Links to other Study Programs of the University
It is a stand-alone offering with possible references to various required and elective modules	All IU Distance Learning Bachelor Programs

Studium Generale I

Course Code: DLBSG01_E

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

Course Description

In the course "Studium Generale I", students deepen their knowledge in a self-selected subject area by completing an IU course outside their applicable curriculum. This gives them the opportunity to look beyond their own subject area and acquire further competencies. The associated option enables students to self-determine their study content to focus even more on issues relevant to them and/or to strengthen or develop selected competencies.

Course Outcomes

On successful completion, students will be able to

- apply acquired key competencies to issues in their field of study and/or in their professional environment.
- to deepen one's own skills and abilities in a self-directed manner.
- to look beyond the boundaries of their own area of expertise.

Contents

- The course "Studium Generale I" offers students the opportunity to take courses outside of their curriculum and the result can be credited as an elective subject. In principle, all IU bachelor courses that fulfill the following requirements are creditable for this purpose:
  - They are not part of an integral part of the applicable mandatory curriculum.
  - They do not have admission requirements or students can prove that they have met the admission requirement.
- The examination of the selected courses must be taken in full and finally passed in order to be credited as part of the 'Studium Generale' .

Literature

Compulsory Reading

Further Reading

- See course description of the selected course

Study Format Distance Learning

Study Format	Course Type
Distance Learning	See Selected Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	See Selected Course

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
0 h	0 h	0 h	0 h	0 h	0 h

Instructional Methods
See Selected Course

Studium Generale II

Course Code: DLBSG02_E

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

Course Description

In the course "Studium Generale II", students deepen their knowledge in a self-selected subject area by completing an IU course outside their applicable curriculum. This gives them the opportunity to look beyond their own subject area and acquire further competencies. The associated option enables students to self-determine their study content to focus even more on issues relevant to them and/or to strengthen or develop selected competencies.

Course Outcomes

On successful completion, students will be able to

- apply acquired key competencies to issues in their field of study and/or in their professional environment.
- to deepen one's own skills and abilities in a self-directed manner.
- to look beyond the boundaries of their own area of expertise.

Contents

- The course "Studium Generale II" offers students the opportunity to take courses outside of their curriculum and the result can be credited as an elective subject. In principle, all IU bachelor courses that fulfill the following requirements can be chosen for this purpose:
  - They are not part of an integral part of the applicable mandatory curriculum.
  - They do not have admission requirements or students can prove that they have met the admission requirement.
- The examination of the selected courses must be taken in full and finally passed in order to be credited as part of the 'Studium Generale' .

Literature

Compulsory Reading

Further Reading

- See course description of the selected course

Study Format Distance Learning

Study Format	Course Type
Distance Learning	See Selected Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	See Selected Course

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
0 h	0 h	0 h	0 h	0 h	0 h

Instructional Methods
See Selected Course

Project: Salesforce Platform Management

Module Code: DLSFPM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Thomas Bolz (Project: Salesforce Fundamentals) / Prof. Dr. Thomas Bolz (Project: CRM with Salesforce Service Cloud)

Contributing Courses to Module

- Project: Salesforce Fundamentals (DLSFPM01)
- Project: CRM with Salesforce Service Cloud (DLSFPM02)

Module Exam Type

Module Exam	Split Exam
	Project: Salesforce Fundamentals • Study Format "Distance Learning": Written Assessment: Project Report Project: CRM with Salesforce Service Cloud • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Project: Salesforce Fundamentals

Using the learning platform trailhead students will learn the fundamentals of Salesforce. At the end of the course students will be able to administer the Salesforce platform. This module prepares them for the Salesforce administrator certification.

Project: CRM with Salesforce Service Cloud

Using the learning platform trailhead students will learn how to manage customer relationships with Salesforce platform. At the end of the course they will be able to manage the Salesforce service cloud. This module prepares students for the Salesforce service cloud certification.

Learning Outcomes

Project: Salesforce Fundamentals

On successful completion, students will be able to

- define what Salesforce and customer relationship management is.
- describe and compare the different options for importing and exporting data in Salesforce.
- create reports and visualize key business metrics in real-time in Salesforce.
- create a simple Salesforce app.
- control access to data using security tools in Salesforce.

Project: CRM with Salesforce Service Cloud

On successful completion, students will be able to

- set up customer service with Salesforce service cloud.
- lead a customer service team in the digital era.
- create digital engagement on multiple channels.
- define service cloud goals and metrics.
- automate case management.
- improve customer service using artificial intelligence.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the fields of Marketing & Sales	All Bachelor Programmes in the Marketing & Communication fields

Project: Salesforce Fundamentals

Course Code: DLSFPM01

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

Course Description

Salesforce is the most used software solution for customer relationship management worldwide. Using the learning platform trailhead students will learn independently the fundamentals of Salesforce. The course introduces Salesforce and explains how to administrate it. Additionally, it presents essentials of the Salesforce platform.

Course Outcomes

On successful completion, students will be able to

- define what Salesforce and customer relationship management is.
- describe and compare the different options for importing and exporting data in Salesforce.
- create reports and visualize key business metrics in real-time in Salesforce.
- create a simple Salesforce app.
- control access to data using security tools in Salesforce.

Contents

- The content on the learning platform focuses on the features and the functionality used to maintain a Salesforce implementation. It provides general knowledge of the features available to end users and the configuration options available to a Salesforce administrator. Furthermore, the content enables to maintain a Salesforce organization, respond to common business requirements, and perform administrative functions using current Salesforce features.

Literature

Compulsory Reading

Further Reading

- Eason, J. (2014): Android Studio 1.0. (URL: http://android-developers.blogspot.de/2014/12/android-studio-10.html [accessed: 22.04.2016]).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Project: CRM with Salesforce Service Cloud

Course Code: DLSFPM02

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

Course Description

This course facilitates key aspects of setting up customer service with Salesforce service cloud on the learning platform trailhead. The course describes how to implement Salesforce service cloud and manage it. It enables to make better business decisions based on customer service data and to create a service metrics strategy. The course shows how to create processes to help support teams become more efficient and manage large data volumes within Salesforce and prepares students for the Salesforce service cloud certification.

Course Outcomes

On successful completion, students will be able to

- set up customer service with Salesforce service cloud.
- lead a customer service team in the digital era.
- create digital engagement on multiple channels.
- define service cloud goals and metrics.
- automate case management.
- improve customer service using artificial intelligence.

Contents

- The content on the learning platform focuses on designing and deploying solutions that support customer business processes and requirements using Salesforce applications. The content enables to design solutions using the Service Cloud functionality and to lead the implementation of these solutions within a customer organization.

Literature

Compulsory Reading

Further Reading

- Eason, J. (2014): Android Studio 1.0. (URL: http://android-developers.blogspot.de/2014/12/android-studio-10.html [accessed: 22.04.2016]).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

AWS Cloud Specialization

Module Code: DLBAWSCLSP

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Georgi Dimchev (Project: AWS - Cloud Essentials) / Prof. Dr. Tianxiang Lu (Project: AWS - Cloud Advanced)

Contributing Courses to Module
▪ Project: AWS - Cloud Essentials (DLBPAWSCLES01) ▪ Project: AWS - Cloud Advanced (DLBPAWSCLAD01)

Module Exam Type	
Module Exam	**Split Exam** <u>Project: AWS - Cloud Essentials</u> • Study Format "Distance Learning": Written Assessment: Project Report <u>Project: AWS - Cloud Advanced</u> • Study Format "Distance Learning": Written Assessment: Project Report

Weight of Module
see curriculum

Module Contents

Project: AWS - Cloud Essentials

Students will learn the foundational concepts and services of Amazon Web Services (AWS), covering its core infrastructure services including computing, storage, and networking through practical experience. Emphasis is placed on practical skills for deploying Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) solutions.

Project: AWS - Cloud Advanced

This course offers advanced understanding of AWS, with a particular emphasis on specialized areas such as Solutions Architecture, Compliance & Security, and AI & Machine Learning. Students will acquire hands-on expertise in these areas, with the goal of enabling them to deploy laaS, Paas, or SaaS workloads using AWS, effectively tackle real-life interdisciplinary challenges, and confidently handle service configurations within the AWS cloud console.

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Learning Outcomes

Project: AWS - Cloud Essentials

On successful completion, students will be able to

- understand the core services of AWS including compute, network, databases, and storage, deployment models (on-premises, hybrid, and vpc).
- explain the shared responsibility model, describe the basic global infrastructure and core security services.
- describe the AWS Well-Architected Framework and the basics of AWS Cloud Migration.
- get familiar with the terminology and concepts related to AWS Services, the AWS Management Console, AWS security measures, IAM and AWS networking services.
- apply and manage core service settings within the AWS cloud console effectively.
- assess data storage services in AWS to meet various application needs.
- plan and implement a scenario-based serverless service for small or medium-sized companies.
- configure basic network security using Amazon CloudWatch monitoring features for simple use cases in AWS, ensuring secure cloud operations.
- critically examine the core billing, account management, and pricing models and explain how to use pricing tools to make cost-effective choices for AWS services.

Project: AWS - Cloud Advanced

On successful completion, students will be able to

- understand and articulate the core services provided by AWS within chosen specialization tracks, including Solutions Architect, Compliance & Security, and AI & Machine Learning.
- critically examine the pros and cons of developing and deploying real-world scenarios using AWS IaaS, PaaS, vs. SaaS and public, private or hybrid deployment demonstrating a clear grasp of the necessary service and deployment intricacies.
- manage and configure profound service settings within the AWS cloud console, showing depth in technical proficiency and operational capabilities.
- critically assess, test and monitor the effect of different AWS deployment features, addressing interdisciplinary challenges through the appropriate use of AWS cloud services in realistic use cases.
- assess and critically reflect on AWS-based solutions, considering industry compliance and security requirements, ensuring a robust understanding of the legal and regulatory framework.
- apply and implement machine learning and artificial intelligence concepts using AWS to solve real-world problems, demonstrating innovative thinking and practical application of theoretical knowledge.

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Links to other Modules within the Study Program

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

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Links to other Study Programs of the University

All Bachelor Programs in the IT & Technology field

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Project: AWS - Cloud Essentials

Course Code: DLBPAWSCLES01

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

Course Description

Amazon Web Services (AWS) is a comprehensive cloud computing platform provided by Amazon that offers scalable computing power, storage, and various other functionalities to help businesses and individuals deploy applications and manage data efficiently. It reduces the need for physical hardware, thus lowering costs and increasing flexibility by allowing users to access services and resources on-demand from anywhere in the world. This service is highly relevant for daily life and business as it supports a wide range of applications and services, from hosting websites to supporting IoT devices and big data analytics, ultimately facilitating innovation, scalability, and global operations.This course prepares students for the AWS Cloud Practitioner Certificate, providing a foundational understanding of AWS core services. Students will learn to articulate the benefits and use cases of AWS IaaS, PaaS, and SaaS, and grasp the basics of public, private, and hybrid cloud deployments. The course emphasizes practical skills in managing and configuring AWS services, ensuring students can effectively navigate the AWS cloud console. It lays the groundwork for critical assessments of AWS deployment features, addressing compliance and security requirements, and preparing students for more advanced AWS certifications and applications

Course Outcomes

On successful completion, students will be able to

- understand the core services of AWS including compute, network, databases, and storage, deployment models (on-premises, hybrid, and vpc).
- explain the shared responsibility model, describe the basic global infrastructure and core security services.
- describe the AWS Well-Architected Framework and the basics of AWS Cloud Migration.
- get familiar with the terminology and concepts related to AWS Services, the AWS Management Console, AWS security measures, IAM and AWS networking services.
- apply and manage core service settings within the AWS cloud console effectively.
- assess data storage services in AWS to meet various application needs.
- plan and implement a scenario-based serverless service for small or medium-sized companies.
- configure basic network security using Amazon CloudWatch monitoring features for simple use cases in AWS, ensuring secure cloud operations.
- critically examine the core billing, account management, and pricing models and explain how to use pricing tools to make cost-effective choices for AWS services.

Contents
▪ This course offers a comprehensive exploration of Amazon Web Services (AWS), focusing on its core services such as computing, networking, databases, and storage solutions. Students will delve into the AWS shared responsibility model, understand the global infrastructure, and learn about the integral security services provided. This also covers the AWS Well-Architected Framework and an introduction of the fundamentals for cloud migration strategies. Through hands-on exercises, students will gain proficiency in managing AWS environments using the AWS Management Console and implement security measures via AWS Identity and Access Management (IAM) and network services. Additionally, the course emphasizes the importance of cost management, enabling students to critically analyze AWS pricing models to make informed financial decisions for cloud-based solutions.

Literature
Compulsory Reading
Further Reading ▪ AWS Training and Certification Skill Builder. (2024). AWS Cloud Practitioner Essentials (7 hours). ▪ AWS Training and Certification Skill Builder. (2024). AWS Cloud Quest: Cloud Practitioner. ▪ AWS Training and Certification Skill Builder. (2024). AWS Technical Essentials (4 hours). ▪ AWS Training and Certification Skill Builder. (2024). Serverless – Knowledge Badge Readiness Path (13 hours). ▪ AWS Training and Certification Skill Builder. (2024). Standard Exam Prep Plan: AWS Certified Cloud Practitioner (CLF-C02) (18 hours).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Project: AWS - Cloud Advanced

Course Code: DLBPAWSCLAD01

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

Course Description

AWS (Amazon Web Services) is a comprehensive cloud computing platform provided by Amazon that offers scalable computing power, storage, and various other functionalities to help businesses and individuals deploy applications and manage data efficiently. It reduces the need for physical hardware, thus lowering costs and increasing flexibility by allowing users to access services and resources on-demand from anywhere in the world. This service is highly relevant for daily life and business as it supports a wide range of applications and services, from hosting websites to supporting IoT devices, big data analytics and machine learning, ultimately facilitating innovation, scalability, and global operations. The course prepares students for the AWS Cloud Solution Architect Professional Certificate. It dives deeper into AWS core services, focusing on sophisticated deployment and management techniques. Students will critically examine and apply real-world scenarios using AWS IaaS, PaaS, and SaaS, and navigate complex deployment models. They will gain technical proficiency in managing advanced service settings within the AWS cloud console and address interdisciplinary challenges through hands-on practice. Additionally, the course covers assessing AWS solutions for compliance and security, ensuring robust understanding of legal frameworks. Students will also implement machine learning and AI concepts to solve real-world problems, fostering innovative thinking and practical application, and preparing them for the dynamic demands of the tech industry.

Course Outcomes
On successful completion, students will be able to ▪ understand and articulate the core services provided by AWS within chosen specialization tracks, including Solutions Architect, Compliance & Security, and AI & Machine Learning. ▪ critically examine the pros and cons of developing and deploying real-world scenarios using AWS IaaS, PaaS, vs. SaaS and public, private or hybrid deployment demonstrating a clear grasp of the necessary service and deployment intricacies. ▪ manage and configure profound service settings within the AWS cloud console, showing depth in technical proficiency and operational capabilities. ▪ critically assess, test and monitor the effect of different AWS deployment features, addressing interdisciplinary challenges through the appropriate use of AWS cloud services in realistic use cases. ▪ assess and critically reflect on AWS-based solutions, considering industry compliance and security requirements, ensuring a robust understanding of the legal and regulatory framework. ▪ apply and implement machine learning and artificial intelligence concepts using AWS to solve real-world problems, demonstrating innovative thinking and practical application of theoretical knowledge.
Contents
▪ This course ensures students gain a comprehensive understanding of AWS, specializing in Solutions Architect, Compliance & Security, and AI & Machine Learning. They will articulate core AWS services and critically examine the pros and cons of deploying real-world scenarios using AWS IaaS, PaaS, SaaS, and different deployment models (public, private, hybrid). ▪ Students will manage and configure service settings within the AWS cloud console, demonstrating technical proficiency. They will assess, test, and monitor AWS deployment features, addressing interdisciplinary challenges using realistic use cases. Additionally, students will evaluate AWS-based solutions for industry compliance and security, understanding the legal and regulatory frameworks. ▪ The course also covers applying machine learning and AI concepts using AWS to solve real-world problems, encouraging innovative thinking and practical application. This approach prepares students to excel in cloud architecture, compliance protocols, security measures, and AI-driven problem-solving, ensuring readiness for the tech industry's dynamic demands.

Literature
Compulsory Reading
Further Reading ▪ AWS Training and Certification Skill Builder. (2024). AWS Solutions Architect – Knowledge Badge Readiness Path (51 hours). ▪ AWS Training and Certification Skill Builder. (2024). Generative AI Learning Plan for Developers (12 hours). ▪ AWS Training and Certification Skill Builder. (2024). Online Course Supplement: Practical Data Science with Amazon SageMaker (1 day).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Internship

Module Code: FSINTER

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

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

Module Coordinator
Prof. Dr. Andreas Simon (Internship)

Contributing Courses to Module
▪ Internship (FSINTER01)

Module Exam Type	
Module Exam Study Format: Distance Learning Internship Re lection Paper (passed / not passed)	**Split Exam**
Weight of Module see curriculum	

Module Contents
Internship according to the Internship Regulations of the IU.

Learning Outcomes	
Internship On successful completion, students will be able to ▪ apply skills and knowledge they have obtained previously during their study program in an entrepreneurial environment. ▪ develop his / her practical and analytical skills in order to improve his / her employability. ▪ have practical knowledge and learn to work within an organization. ▪ acquire a first deep insight into organizational structures and communication procedures. ▪ apply comminication skills, socials skills, problem solving, time and project management which will shape their general management skills. ▪ shape their personality with the help of the interdisciplinary nature of the course especially in the area of the key qualifications like interpersonal skills or intercultural skills.	
Links to other Modules within the Study Program Builds on modules of the chosen degree program	**Links to other Study Programs of the University** All myStudies programs

Internship

Course Code: FSINTER01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
	English		10	None

Course Description
This module consists of two parts: (1) preparation tutorials and (2) the internship itself. During the preparation tutorials, students will learn about the intention of the internship and about the intellectual as well as social requirements of the working environment.

Course Outcomes

On successful completion, students will be able to

- apply skills and knowledge they have obtained previously during their study program in an entrepreneurial environment.
- develop his / her practical and analytical skills in order to improve his / her employability.
- have practical knowledge and learn to work within an organization.
- acquire a first deep insight into organizational structures and communication procedures.
- apply comminication skills, socials skills, problem solving, time and project management which will shape their general management skills.
- shape their personality with the help of the interdisciplinary nature of the course especially in the area of the key qualifications like interpersonal skills or intercultural skills.

Contents

- Internship according to the Internship Regulations of the IU.

Literature

Compulsory Reading

Further Reading

- Sweitzer, F. H. & King, M. A. (2009). The Successful Internship: Personal, Professional, and Civic Development. 3rd ed.. Cengage. ISBN: 0-495-59642-6.
- Kaser, K., Brooks, J. R. & Brooks, K. (2007). Making the Most of your Internship. Thomson. ISBN: 0-538-44432-0.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Internship Reflection Paper (passed / not passed)

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
0 h	0 h	0 h	0 h	300 h	300 h

Instructional Methods
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions

Salesforce Platform Development

Module Code: DLSFPD

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Thomas Bolz (Project: Salesforce Platform App Builder) / Prof. Dr. Thomas Bolz (Project: Salesforce Platform Developer)

Contributing Courses to Module

- Project: Salesforce Platform App Builder (DLSFPD01)
- Project: Salesforce Platform Developer (DLSFPD02)

Module Exam Type

Module Exam	Split Exam
	Project: Salesforce Platform App Builder • Study Format "Distance Learning": Written Assessment: Project Report Project: Salesforce Platform Developer • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Project: Salesforce Platform App Builder

Using the learning platform Trailhead students will learn the fundamentals of Salesforce. At the end of the course, the students will be able to design, build and deploy custom applications. This course prepares them for the Salesforce Platform App Builder Certification.

Project: Salesforce Platform Developer

Using the learning platform Trailhead students will learn how to develop own applications, built from various parts of the Salesforce platform. At the end of the course they will be able to use Apex, Visualforce and basic Lightning components. This course prepares the students for the Salesforce Platform Developer I Certification.

Learning Outcomes

Project: Salesforce Platform App Builder

On successful completion, students will be able to

- define what Salesforce and customer relationship management is,
- design the data model, user interface, and business logic for custom applications,
- customize applications for mobile use,
- design reports and dashboards,
- manage application security and deploy custom applications.

Project: Salesforce Platform Developer

On successful completion, students will be able to

- develop own applications using Apex and basic Lightning components,
- write SOSL, SOQL and DML statements,
- use Visualforce to build custom user interfaces for mobile and web apps,
- build reusable, performant components that follow modern web standards,
- use the built-in testing framework to test Apex and Visualforce.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Marketing & Sales	All Bachelor Programs in the Marketing & Communication field

Project: Salesforce Platform App Builder

Course Code: DLSFPD01

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

Course Description

Salesforce is the most used software solution for customer relationship management worldwide. This solution can be customized and personalized for the needs of customers, partners and employees. Using the learning platform Trailhead, students will learn independently the fundamentals of Salesforce and the development of customized application. This course prepares students for the Salesforce Platform App Builder Certification.

Course Outcomes

On successful completion, students will be able to

- define what Salesforce and customer relationship management is,
- design the data model, user interface, and business logic for custom applications,
- customize applications for mobile use,
- design reports and dashboards,
- manage application security and deploy custom applications.

Contents

- The content on the learning platform focuses on the features and functionality to design, build and deploy custom applications. The content also provides knowledge to define business logic and process automation declaratively. Furthermore, the design and management of the correct data models and the customization of applications for individual needs is included in this course. Thus, the content of this course enables to automate repetitive tasks and to optimize processes in customer organizations.

Literature
Compulsory Reading
Further Reading ▪ Gupta, R. (2019): Salesforce Platform App Builder Certification. A Practical Study Guide. 1st ed., Apress. ▪ Weinmeister, P. (2019): Practical Salesforce Development Without Code. Building Declarative Solutions on the Salesforce Platform. 2nd ed., Apress, Berkeley. ▪ Shaalan, S. (2020): Salesforce for Beginners. A step-by-step guide to creating, managing, and automating sales and marketing processes. Packt Publishing, Birmingham. ▪ Benioff, M./Langley, M. (2019): Trailblazer. The Power of Business as the Greatest Platform for Change. 1st ed.

Study Format Distance Learning

Study Format	**Course Type**
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Project: Salesforce Platform Developer

Course Code: DLSFPD02

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

Course Description

The Salesforce platform not only forms the foundation of core Salesforce products like Sales Cloud and Service Cloud, but it is also possible to build own functionalities and own applications. Using the learning platform Trailhead, students will learn how to use the programmatic pillars of the Salesforce platform: Lightning components, Apex and Visualforce. This course prepares students for the Salesforce Platform Developer I Certification.

Course Outcomes

On successful completion, students will be able to

- develop own applications using Apex and basic Lightning components,
- write SOSL, SOQL and DML statements,
- use Visualforce to build custom user interfaces for mobile and web apps,
- build reusable, performant components that follow modern web standards,
- use the built-in testing framework to test Apex and Visualforce.

Contents

- The content on the learning platform focuses on the development of own functionality and own applications, built from various parts of the Salesforce platform. The content enables to use the programmatic elements Lightning components, Apex and Visualforce. Furthermore, knowledge is provided for data modeling, process automation, user interface design, testing and deployment. Thus, the content of this course enables to extend Salesforce by individual applications to cover the needs in customer organizations.

Literature

Compulsory Reading

Further Reading

- Salesforce (2020): Developer Documentation. (URL: https://developer.salesforce.com/docs/ [accessed: 12.12.2020])

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Mobile Software Engineering

Module Code: DLBCSEMSE

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. jan Rüterbories (Mobile Software Engineering) / Dr. Christian Remfert (Project: Mobile Software Engineering)

Contributing Courses to Module

- Mobile Software Engineering (DLBCSEMSE01)
- Project: Mobile Software Engineering (DLBCSEMSE02)

Module Exam Type	
Module Exam	**Split Exam** Mobile Software Engineering • Study Format "Distance Learning": Exam, 90 Minutes Project: Mobile Software Engineering • Study Format "Distance Learning": Written Assessment: Project Report
Weight of Module see curriculum	

Module Contents
Mobile Software Engineering ▪ Basics of mobile software development ▪ Android system architecture ▪ Development environment ▪ Core components of an Android app ▪ Interaction between application components ▪ Advanced techniques **Project: Mobile Software Engineering** Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task.

Learning Outcomes
Mobile Software Engineering On successful completion, students will be able to ▪ recognize the differences and peculiarities of software development for mobile systems and explain them. ▪ differentiate between different activities, roles, and risks in the creation, operation, and maintenance of mobile software systems. ▪ explain and differentiate between the architecture and technical features of the Android platform. ▪ independently create mobile software systems to solve concrete problems for the “Android” platform. **Project: Mobile Software Engineering** On successful completion, students will be able to ▪ independently design and create a prototype of a small mobile application to solve a specific problem. ▪ recognize typical problems and challenges in the practical implementation of small mobile applications. ▪ document the conception and implementation of small, independently designed and implemented mobile applications.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the fields of Computer Science & Software Development	All Bachelor Programs in the IT & Technology fields

Mobile Software Engineering

Course Code: DLBCSEMSE01

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

Course Description

Using the mobile platform "Android" as an example, it will be demonstrated how the programming of mobile applications (apps) differs from the development of browser-based information systems, which technologies and programming concepts are typically used, and which typical challenges there are in app development for industrial applications.

Course Outcomes

On successful completion, students will be able to

- recognize the differences and peculiarities of software development for mobile systems and explain them.
- differentiate between different activities, roles, and risks in the creation, operation, and maintenance of mobile software systems.
- explain and differentiate between the architecture and technical features of the Android platform.
- independently create mobile software systems to solve concrete problems for the “Android” platform.

Contents

1. Basics of Mobile Software Development
   - 1.1 Special Features of Mobile Devices
   - 1.2 Special Features of Mobile Software Development
   - 1.3 Classification of Mobile Devices
   - 1.4 The Android Platform

2. Android System Architecture
   - 2.1 The Android System
   - 2.2 Safety and Security
   - 2.3 Communication with Networks

3. Development Environment
   - 3.1 Android Studio
   - 3.2 First App and Emulator Test

3.3 Application Deployment

4. Core Components of an Android App
   4.1 Overview of the Components of an Android App
   4.2 Activities, Layouts, and Views
   4.3 Resources
   4.4 Summary in an App
   4.5 Graphic Design

5. Interaction Between Application Components
   5.1 Intents
   5.2 Services
   5.3 Broadcast Receiver

6. Advanced Techniques
   6.1 Threading
   6.2 Application Memory

Literature

Compulsory Reading

Further Reading

- Allen, G. (2021). Android for absolute beginners: Getting started with mobile apps development using the Android Java SDK. Apress.
- Boyer, R., & Mew, K. (2016). Android application development cookbook (2nd ed.). Packt Publishing.
- Collins, L., & Ellis, R. S. (2015). Mobile devices: Tools and technologies. CRC Press.
- Hagos, T. (2020): Learn Android Studio 4: Efficient Java-Based Android Apps Development. Berkeley, CA: Apress.
- Meike, B. G., & Schiefer, L. (2022). Inside the Android OS: Building, customizing, managing, and operating Android system services. Pearson.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload

Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods

Tutorial Support	Learning Material	Exam Preparation
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Project: Mobile Software Engineering

Course Code: DLBCSEMSE02

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

Course Description

Using the knowledge gained in the course "Mobile Software Engineering using the Android platform as an example", students independently create a mobile application and document its conception and implementation.

Course Outcomes

On successful completion, students will be able to

- independently design and create a prototype of a small mobile application to solve a specific problem.
- recognize typical problems and challenges in the practical implementation of small mobile applications.
- document the conception and implementation of small, independently designed and implemented mobile applications.

Contents

- Conception, implementation, and documentation of small, mobile applications on the basis of a concrete task. Possible topics are, for example:
- A radio app to improve the exchange between listeners and stations in general, and listeners and radio presenters in particular.
- An app that allows a group of board game fans to better organize their regular evening game.
- An app that theses supervisors at IUBH can use to improve their supervision processes.

Literature

Compulsory Reading

Further Reading

- Allen, G. (2021): Android for Absolute Beginners [electronic resource]: Getting Started with Mobile Apps Development Using the Android Java SDK. Berkeley, CA: Apress.
- Boyer, R. & Mew, K. (2016): Android Application Development Cookbook - Second Edition. Birmingham, UK : Packt Publishing.
- Hagos, T. (2020): Learn Android Studio 4: Efficient Java-Based Android Apps Development. Berkeley, CA: Apress.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Big Data and Cloud Technologies

Module Code: DLBCSEBDCT

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator
Prof. Dr. Christian Müller-Kett (Big Data Technologies) / Prof. Dr. Tianxiang Lu (Cloud Computing)

Contributing Courses to Module
▪ Big Data Technologies (DLBDSBDT01) ▪ Cloud Computing (DLBDSCC01)

Module Exam Type	
Module Exam	**Split Exam** Big Data Technologies • Study Format "Distance Learning": Exam, 90 Minutes Cloud Computing • Study Format "Distance Learning": Exam, 90 Minutes
Weight of Module see curriculum	

Module Contents

Big Data Technologies

- Data types and data sources
- Text-based and binary data formats
- Distributed systems
- Streaming frameworks
- NoSQL approach to data storage

Cloud Computing

- 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

Big Data Technologies

On successful completion, students will be able to

- name types and sources of data.
- understand text-based and binary data formats.
- analyze the requirements and constraints of distributed analysis systems.
- evaluate the applications of streaming frameworks.
- describe the motivation for NoSQL data stores and categorize pertaining established concepts.

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	**Links to other Study Programs of the University**
This module is similar to other modules in the field(s) of Computer Science & Software Developement.	All Bachelor Programmes in the IT & Technology field(s).

Big Data Technologies

Course Code: DLBDSBDT01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBCSDMDS01

Course Description

Data are often considered the “new oil”, the raw material from which value is created. To harness the power of data, the data need to be stored and processed on a technical level. This course introduces the four “Vs” of data, as well as typical data sources and types. The course discusses the most common data storage formats encountered in modern systems, focusing both on text-based as well as binary data formats.Handling large amounts of data poses significant challenges for the underlying infrastructure. The course discusses the most important distributed and streaming data handling frameworks which are used in leading edge applications.

Course Outcomes

On successful completion, students will be able to

- name types and sources of data.
- understand text-based and binary data formats.
- analyze the requirements and constraints of distributed analysis systems.
- evaluate the applications of streaming frameworks.
- describe the motivation for NoSQL data stores and categorize pertaining established concepts.

Contents

1. Data Types and Data Sources
    - 1.1 The 4Vs of data: volume, velocity, variety, veracity
    - 1.2 Data sources
    - 1.3 Data types
2. Working with Common Data Formats
    - 2.1 Text-Based Formats (CSV, XML, JSON)
    - 2.2 Binary Formats (HDF5, Parquet, Arrow)
3. NoSQL data stores
    - 3.1 Introduction and motivation
    - 3.2 Approaches and technical concepts
4. Distributed Systems

4.1 Hadoop & MapReduce
4.2 Hadoop file system (HDFS)
4.3 Spark
4.4 DASK

5. Streaming Frameworks
5.1 Spark streaming
5.2 Kafka

Literature

Compulsory Reading

Further Reading

- Kleppmann, M. (2017). Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems. O'Reilly.
- White, T. (2015). Hadoop: The definitive guide. O'Reilly.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Cloud Computing

Course Code: DLBDSCC01

Study Level	Language of Instruction and Examination	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 General Overview
   - 4.2 Google Cloud Platform
   - 4.3 Amazon Web Services
   - 4.4 Microsoft Azure
   - 4.5 Platform Comparison

5. Data Science in the Cloud
   - 5.1 Provider-independent services and tools
   - 5.2 Google Data Science and Machine Learning Services
   - 5.3 Amazon Web Services Data Science and Machine Learning Services
   - 5.4 Microsoft Azure Data Science and Machine Learning Services

Literature

Compulsory Reading

Further Reading

- Goessling, S., & Jackson, K. L. (2018). Architecting cloud computing solutions. Packt Publishing.
- Mahmood, Z., Puttini, R., & Erl, T. (2013). Cloud computing: Concepts, technology & architecture. Prentice Hall.
- Sehgal, N. K., & Bhatt, P. C. P. (2023). Cloud computing with security and scalability: Concepts and practices.
- Zonooz, P., Farr, E., Arora, K., & Laszewski, T. (2018). Cloud native architectures. Packt Publishing.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

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 and Examination
see curriculum	Minimaldauer: 1 Semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Maik Drozdzynski (Business Intelligence) / Prof. Dr. Neil Arvin Bretana (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

- Motivation and Conceptualization
- Data Provision
- Data Warehouse
- Modeling of Multidimensional Data Spaces
- Analysis Systems
- Distribution and Access

Project: Business Intelligence

Possible topics for the BI project include “Management of BI projects”, “Design of multidimensional data models” and “Prototypical implementation of small BI applications”.

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	**Links to other Study Programs of the University**
This module is similar to other modules in the fields of Computer Science & Software Development	All Bachelor Programmes in the IT & Technology fields

Business Intelligence

Course Code: DLBCSEBI01

Study Level	Language of Instruction and Examination	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

- Grossmann, W., & Rinderle-Ma, S. (2015). Fundamentals of business intelligence. Springer.
- Sharda, R., Delen, D., & Turban, E. (2015). Business intelligence and analytics: Systems for decision support (10th ed.). Pearson.
- Sherman, R. (2014). Business intelligence guidebook: From data integration to analytics. Morgan Kaufmann.
- Vaisman, A., & Zimányi, E. (2022). Data warehouse systems: Design and implementation. Springer.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Course Book ☑ Video ☑ Slides	☑ Practice Exam ☑ Online Tests

Project: Business Intelligence

Course Code: DLBCSEBI02

Study Level	Language of Instruction and Examination	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

- Liedtka, J. (2018). Why design thinking works. Harvard Business Review, 2018(9), 72–79.
- Meinel, C., & Leifer, L. J. (2021). Design thinking research: Interrogating the doing. Springer International Publishing.
- Meinel, C., Plattner, H., & Leifer, L. (2011). Design thinking: Understand – Improve – Apply. Springer Berlin Heidelberg.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Software Engineering with Python

Module Code: DLBCSESEWP

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator
Prof. Dr. Max Pumperla (Project: Object Oriented and Functional Programming in Python) / Prof. Dr. Max Pumperla (Data Science Software Engineering)

Contributing Courses to Module
▪ Project: Object Oriented and Functional Programming in Python (DLBDSOOFPP01) ▪ Data Science Software Engineering (DLBDSDSSE01)

Module Exam Type	
Module Exam	**Split Exam** Project: Object Oriented and Functional Programming in Python • Study Format "Distance Learning": Portfolio Data Science Software Engineering • Study Format "Distance Learning": Exam, 90 Minutes
Weight of Module see curriculum	

Module Contents
Project: Object Oriented and Functional Programming in Python ▪ 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. **Data Science Software Engineering** ▪ Traditional project management ▪ Agile project management ▪ Testing ▪ Software development paradigms ▪ From model to production
Learning Outcomes **Project: 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. **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	Links to other Study Programs of the University
This module is similar to other modules in the field(s) of Data Science & Artificial Intelligence.	All Bachelor Programmes in the IT & Technology field(s).

Project: Object Oriented and Functional Programming in Python

Course Code: DLBDSOOFPP01

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

Course Description

Students will build upon their foundational knowledge of Python programming, by exploring 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

- Students are being provided 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. ▪ Lutz, M. (2013). Learning Python (5th ed.). O'Reilly. ▪ 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. ▪ Ramalho, L. (2015). Fluent Python: Clear, concise, and effective programming. O'Reilly.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Portfolio

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Data Science Software Engineering

Course Code: DLBDSDSSE01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	CSEBDSIPWP01 and (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 trests
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 ▪ Brookshear, G., & Brylow, D. (2019). Computer science: An overview. Pearson Education. ▪ Stephens, R. (2015). Beginning software engineering. John Wiley & Sons.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Slides	

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Johannes Kent Walter (IT Project Management) / Prof. Dr. Claudia Heß (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	Links to other Study Programs of the University
This module is similar to other modules in the field of Computer Science & Software Developement.	All Bachelor Programmes in the IT & Technology field.

IT Project Management

Course Code: DLBCSEITPAM01

Study Level	Language of Instruction and Examination	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

- Project Management Institute. (2021). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Seventh Edition and The Standard for Project Management (ENGLISH): Vol. Seventh edition. Project Management Institute.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint	☑ Course Book ☑ Video ☑ Audio ☑ Slides	☑ Practice Exam ☑ Online Tests

IT Architecture Management

Course Code: DLBCSEITPAM02

Study Level	Language of Instruction and Examination	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

- Ahlemann, F., Messerschmidt, M., Stettiner, E., & Legner, C. (2012). Strategic enterprise architecture management. Challenges, best practices, and future developments. Springer-Verlag.
- Perroud, T., & Inversini, R. (2013). Enterprise architecture patterns: Practical solutions for recurring IT-architecture problems. Springer.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Mastering Prompts

Module Code: DLBWMP_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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Kristina Schaaff (Artificial Intelligence) / Prof. Dr. Knut Linke (Project: AI Excellence with Creative Prompting Techniques)

Contributing Courses to Module
▪ Artificial Intelligence (DLBDSEAIS01) ▪ Project: AI Excellence with Creative Prompting Techniques (DLBPKIEKPT01_E)

Module Exam Type	
Module Exam	**Split Exam** <u>Artificial Intelligence</u> • Study Format "Distance Learning": Exam, 90 Minutes <u>Project: AI Excellence with Creative Prompting Techniques</u> • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Artificial Intelligence

Project: AI Excellence with Creative Prompting Techniques

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.

Project: AI Excellence with Creative Prompting Techniques

On successful completion, students will be able to

- comprehend and apply basic prompting techniques in generative AI applications.
- analyze and evaluate the effectiveness of the basic prompts.
- apply ethical considerations to the design and use of AI for basic prompting techniques.
- design, implement, and refine effective prompts to real-world scenarios through hands-on exercises.
- showcase creative and innovative thinking in the application of prompting techniques to solve complex problems in their field of studies.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the field of Data Science & Artificial Intelligence	All Bachelor Programs in the IT & Technology field

Artificial Intelligence

Course Code: DLBDSEAIS01

Study Level	Language of Instruction and Examination	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 Introduction to Computer Vision
   5.2 Image Representation and Geometry
   5.3 Feature Detection
   5.4 Semantic Segmentation

Literature

Compulsory Reading

Further Reading

- Bear, F., Barry, W., & Paradiso, M. (2020). Neuroscience: Exploring the brain (4th ed.). Lippincott Williams & Wilkins.
- Chollet, F. (2018). Deep learning with Python. Manning.
- Géron, A. (2017). Hands-on machine learning with Scikit-Learn and TensorFlow. O’Reilly.
- Géron, A. (2019). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools, and techniques to build intelligent systems (2nd ed.). O’Reilly.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning. MIT Press.
- Grus, J. (2019). Data science from scratch: First principles with Python. O’Reilly.
- Jurafsky, D., & Martin, J. H. (2022). Speech and language processing (3rd ed.). Prentice Hall.
- Russell, S. J., & Norvig, P. (2022). Artificial Intelligence: A modern approach (4th ed., global ed.). Pearson.
- Sutton, R. S., & Barto, A. G. (2018). Reinforcement learning: An introduction (2nd ed.). MIT Press. (Adaptive Computation and Machine Learning series).
- Szeliski, R. (2022). Computer vision: Algorithms and applications (2nd ed.). Springer. (Texts in Computer Science series).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Exam, 90 Minutes

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
90 h	0 h	30 h	30 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed	☑ Course Book	☑ Practice Exam
☑ Intensive Live Sessions/Learning Sprint	☑ Video	☑ Online Tests
☑ Recorded Live Sessions	☑ Audio	
	☑ Slides	

Project: AI Excellence with Creative Prompting Techniques

Course Code: DLBPKIEKPT01_E

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

Course Description
In this course, students explore the fascinating world of prompting in generative AI applications. They engage in hands-on exercises to create new AI-generated content including text, images, and videos. Through these exercises, students learn how to effectively use, analyze, and evaluate these systems within their respective fields of study.

Course Outcomes

On successful completion, students will be able to

- comprehend and apply basic prompting techniques in generative AI applications.
- analyze and evaluate the effectiveness of the basic prompts.
- apply ethical considerations to the design and use of AI for basic prompting techniques.
- design, implement, and refine effective prompts to real-world scenarios through hands-on exercises.
- showcase creative and innovative thinking in the application of prompting techniques to solve complex problems in their field of studies.

Contents

- In this course, students work on a basic practical implementation of a generative AI use case by choosing from a selection provided in the complementary guideline. The course provides practical examples as learning materials and exercises with basic prompting techniques for open-source text, image, and video generation use cases. The exercises are designed to inspire and guide students in completing their own generative AI use case work, which includes a use case description, chosen prompting techniques, outcomes, and critical evaluations from both technical and ethical perspectives.

Literature
Compulsory Reading
Further Reading

- Dang, H., Mecke, L., Lehmann, F., Goller, S., & Buschek, D. (2022). How to prompt? Opportunities and challenges of zero- and few-shot learning for human-AI interaction in creative applications of generative models. arXiv. https://arxiv.org/pdf/2209.01390.pdf
- Eapen, T. T., Finkenstadt, D. J., Folk, J., & Venkataswamy, L. (2023). How generative AI can augment human creativity. Harvard Business Review, July–August, 56–64.
- Wei, J., Wang, X., Schuurmans, D., Bosma, M. Ichter, B., Xia, F., Chi, E. H., Le., Q. V., & Zhou, D. (2023). Chain-of-though prompting elicit reasoning in large language models. arXiv. https://arxiv.org/pdf/2201.11903.pdf

Study Format Distance Learning

Study Format	**Course Type**
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Career Development

Module Code: DLBKAENT_E

Module Type	Admission Requirements	Study Level	CP	Student Workload
see curriculum		BA	10	300 h

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

Module Coordinator

Prof. Dr. Annette Strauß (Personal Career Plan) / Prof. Dr. Heike Schiebeck (Personal Elevator Pitch)

Contributing Courses to Module

- Personal Career Plan (DLBKAENT01_E)
- Personal Elevator Pitch (DLBKAENT02_E)

Module Exam Type

Module Exam	Split Exam
	Personal Career Plan • Study Format "Distance Learning": Advanced Workbook Personal Elevator Pitch • Study Format "Distance Learning": Concept Presentation

Weight of Module
see curriculum

Module Contents

Personal Career Plan

- Career Theories and Models
- Career Development
- Choosing Possible Careers
- Personal Branding
- Career Strategy
- Global Careers
- Employment Search

Personal Elevator Pitch

Through the application of self-reflection, self-awareness based on relevant career success parameters students should develop career goals, career stages, and their career strategy. Taking into account their current professional and/or study situation, the central elements of a short-, and medium-term career planning are worked out by the students for their individual case. At the end of the course, students will be able to present their personal elevator pitch and communicate it in a proper way that is appropriate for the target group or audience. In this way, they will reflect on their current professional situation. The personal elevator pitch, being at hear of personal branding, supports the conveyance of this vision during personal networking activities.

Learning Outcomes	
Personal Career Plan On successful completion, students will be able to ▪ understand, apply, and reflect presented career theory and models with regard to their personal situation to arrive at a concept or pictore of a desired career. ▪ understand and critically reflect the concept of career and career planning. ▪ understand the relevance of a strategically oriented career planning. ▪ understand the importance of and conduct a personal assessment to identify one's personality, values, motivation, strengths, competencies, skills, and interests. ▪ understand the necessity of building and maintaining their own personal brand. ▪ understand differing job search processes across national/international contexts, and to create context-sensitive job applications accordingly. ▪ understand the principles of global careers and how to effectively act in international environments. **Personal Elevator Pitch** On successful completion, students will be able to ▪ identify their career goals, career stages, and the personal status quo with regard to their achievement. ▪ reflect their current situation and define where they want to aim. ▪ develop a career strategy by creating personal career goals and a coherent action plan. ▪ understand and apply the process of building a personal brand. ▪ define their identity, skills, profession, reasons to believe and necessary investments. ▪ identify their personal strengths and their core driver. ▪ understand the power of effective communication, networking, and storytelling. ▪ understand the principles and apply the process of designing a strong personal elevator pitch. ▪ critically reflect and adapt their personal elevator pitch to the specificities of the context, audience, target group, and way of delivery.	
Links to other Modules within the Study Program	**Links to other Study Programs of the University**
This module is similar to other modules in the field of Human Resources	All Bachelor Programs in the Human Resources field

Personal Career Plan

Course Code: DLBKAENT01_E

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

Course Description

In today's complex and ever-changing environment, the forms of careers vary depending on the context, understanding of values, and market dynamics. The 'classic career ladder' that one is climbing being the only predominant form of career is long outdated, and individuals are being confronted with a great number of opportunities regarding industry or job choice and working arrangements.Considering the great variety of options especially for well-educated individuals, has become more important than ever to make informed decisions. This course is designed to support students maneauvering themselves through these complexities of their personal career plan, whereby self-awareness, self-reflection, and goal-setting are important elements of this process. Guided by central elements of career theory, career models, and research outcomes, students will be given tools and reflection exercises to arrive at a solid, directly applicable strategy to further steet their professional progress and career steps.

Course Outcomes

On successful completion, students will be able to

- understand, apply, and reflect presented career theory and models with regard to their personal situation to arrive at a concept or pictore of a desired career.
- understand and critically reflect the concept of career and career planning.
- understand the relevance of a strategically oriented career planning.
- understand the importance of and conduct a personal assessment to identify one's personality, values, motivation, strengths, competencies, skills, and interests.
- understand the necessity of building and maintaining their own personal brand.
- understand differing job search processes across national/international contexts, and to create context-sensitive job applications accordingly.
- understand the principles of global careers and how to effectively act in international environments.

Contents

1. Career Theories and Approaches
   - 1.1 Traditional Career Theories and Models
   - 1.2 Protean Career Orientation
   - 1.3 Career Learning Cycle

2. Career Development

2.1 Career Motives
2.2 Career Roles
2.3 Career Performance

3. Career Planning
   3.1 Essentials of Career Planning
   3.2 The Career Planning Process
   3.3 Contingencies of Career Planning

4. Personal Assessment
   4.1 Personality
   4.2 Values and Motivation
   4.3 Competencies, Skills, Strengths, and Fields of Interest

5. Career Choice
   5.1 Possible Career Paths
   5.2 Forms of Careers
   5.3 Employability
   5.4 Career Identity

6. Develop a Career Strategy and Manage your Career
   6.1 Career Capital
   6.2 Career Goals
   6.3 Career Success
   6.4 Personal Reflection
   6.5 Personal Branding

7. Global Careers
   7.1 Forms of Global Careers
   7.2 Individual Characteristics of Global Leaders
   7.3 Role of Interculturality
   7.4 Diversity and Inclusion

8. Search for Employment in Germany and Abroad
   8.1 Job Search Databases
   8.2 Networks and Platforms
   8.3 Shaping Resume and Cover Letter
   8.4 Written and Video Application
   8.5 Selection Procedures

Literature
Compulsory Reading
Further Reading ▪ Baruch, Y. (2022). Managing Careers and Employability. SAGE. ▪ Greenhaus, J.H., Callanan, G.A., & Godshalk, V.M. (2018). Career Management for Life (5th edition). College of Business & Public Management Faculty Books. ▪ Hoeckstra, H. (2011). A career roles model of career development. Journal of Vocational Behavior, 78(2), 159-173. ▪ Ibarra, H. (2004). Working Identity: Unconventional Strategies for Reinventing Your Career. Harvard Business School Press. ▪ Kingsley, T. (2022). Personal Branding. Independently published. ▪ Ng, T.W.H., Eby, L.T., Sorensen, K.L., & Feldman, D.C. (2005). Predictors of objective and subjective career success: A meta-analysis. Personnel psychology, 58(2), 367-408. ▪ Ng, T.W.H., & Feldman, D.C. (2014). Subjective career success: A meta-analytic review. Journal of Vocational Behavior, 85(2), 169-179.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Theory Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** yes
Type of Exam	Advanced Workbook

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
110 h	0 h	20 h	20 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Course Book ☑ Video ☑ Slides	☑ Online Tests ☑ Guideline

Personal Elevator Pitch

Course Code: DLBKAENT02_E

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
BA	English		5	DLBKAENT01_E

Course Description

The forms of careers vary depending on the context or personal preferences in today's ever-changing, demanding, and complex environment. Changes in the environment, as for example technology, sustainability, and the rise of artificial intelligence, push individuals to take career transitions into their own hands. Personal endeavors to develop one's career through the acquisition of, for instance, new projects, jobs, or employers, require the right strategies to be successful. Contacts through targeted networking and the development of one's own brand play a special role here. Evenly so for individuals starting their careers after having accomplished their education, effective networking is key to career entry and development in these turbulent times. In addition, personal branding is a concept that not only has gained relevance in research but is also widely used in career counseling. Developing and conveying a personal brand is central to this course. Using the personal branding approach during networking activities, individuals can actively contribute to their career success.

Course Outcomes

On successful completion, students will be able to

- identify their career goals, career stages, and the personal status quo with regard to their achievement.
- reflect their current situation and define where they want to aim.
- develop a career strategy by creating personal career goals and a coherent action plan.
- understand and apply the process of building a personal brand.
- define their identity, skills, profession, reasons to believe and necessary investments.
- identify their personal strengths and their core driver.
- understand the power of effective communication, networking, and storytelling.
- understand the principles and apply the process of designing a strong personal elevator pitch.
- critically reflect and adapt their personal elevator pitch to the specificities of the context, audience, target group, and way of delivery.

Contents

- The core element of this course is a personal elevator pitch with the use of a personal branding canvas. The creation of a personal brand is not only relevant for self-employed freelancers or entrepreneurs but is as well helpful for individuals who strive for their own further development on the career ladder within their organization or for those who are seeking employment. Having understood the characteristics of and reasoning behind personal branding and the underlying process, students will be able to apply this process to their own person and situation.

- Self-awareness being the main 'ingredient' for an effective personal brand, students will be encouraged to go on an intensive self-reflection journey to deepen their understanding of their identity, skills, profession, and reasons to believe for a personal brand, and subsequently, for a personal elevator pitch.
- Being at the heart of and the essence of personal branding, the elevator pitch enables individuals to impactfully present themselves in a nutshell to important individuals and potential employers. Having understood the principles and key success factors characterizing an elevator pitch, students will be able to develop their own one. They will learn to consider aspects like timing, benefit, clear positioning, target audience through an oral form of delivery. In addition, the role of communication, networking and storytelling principles will be highlighted.
- Knowledge of the core elements and success factors of the personal elevator pitch within the framework of the individual career development.

Literature

Compulsory Reading

Further Reading

- Dowling, D. (2009). How to Perfect an Elevator Pitch About Yourself. Harvard Business Review. https://hbr.org/2009/05/how-to-perfect-an-elevator-pit.
- Gorbatov, S., Khapova, S.N., & Lysova, E.I. (2018). Personal branding: Interdisciplinary systematic review and research agenda. Frontiers in psychology, 2238.
- Gorbatov, S., Khapova, S.N., & Lysova, E.I. (2019). Get noticed to get ahead: The impact of personal branding on career success. Frontiers in psychology, 2662.
- Jourdan Jr., Louis F., Deis, M., & Lysova, E.I. (2010). Getting Your Elevator Pitch To The Plate. Business Journal for Entrepreneurs, 2010(1), 43-47.
- Woodside, A.G. (2010). Brand consumer storytelling theory and research: Introduction to a Psychology & Marketing special issue. Psychology & Marketing, 27(6), 531-540.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Concept Presentation

Student Workload

Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods

Tutorial Support	Learning Material	Exam Preparation
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Studium Generale I and II

Module Code: DLBSG_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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
N.N. (Studium Generale I) / N.N. (Studium Generale II)

Contributing Courses to Module
▪ Studium Generale I (DLBSG01_E) ▪ Studium Generale II (DLBSG02_E)

Module Exam Type	
Module Exam	**Split Exam** <u>Studium Generale I</u> • Study Format "Distance Learning": See Selected Course <u>Studium Generale II</u> • Study Format "Distance Learning": See Selected Course
Weight of Module see curriculum	

Module Contents **Studium Generale I** In principle, all IU bachelor courses can be selected as courses for the "Studium Generale", so that the content can be chosen from the entire breadth of the IU distance learning program. **Studium Generale II** In principle, all IU bachelor courses can be selected as courses for the "Studium Generale", so that the content can be chosen from the entire breadth of the IU distance learning program.
Learning Outcomes **Studium Generale I** On successful completion, students will be able to ▪ apply acquired key competencies to issues in their field of study and/or in their professional environment. ▪ to deepen one's own skills and abilities in a self-directed manner. ▪ to look beyond the boundaries of their own area of expertise. **Studium Generale II** On successful completion, students will be able to ▪ apply acquired key competencies to issues in their field of study and/or in their professional environment. ▪ to deepen one's own skills and abilities in a self-directed manner. ▪ to look beyond the boundaries of their own area of expertise.

Links to other Modules within the Study Program	**Links to other Study Programs of the University**
It is a stand-alone offering with possible references to various required and elective modules	All IU Distance Learning Bachelor Programs

Studium Generale I

Course Code: DLBSG01_E

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

Course Description

In the course "Studium Generale I", students deepen their knowledge in a self-selected subject area by completing an IU course outside their applicable curriculum. This gives them the opportunity to look beyond their own subject area and acquire further competencies. The associated option enables students to self-determine their study content to focus even more on issues relevant to them and/or to strengthen or develop selected competencies.

Course Outcomes

On successful completion, students will be able to

- apply acquired key competencies to issues in their field of study and/or in their professional environment.
- to deepen one's own skills and abilities in a self-directed manner.
- to look beyond the boundaries of their own area of expertise.

Contents

- The course "Studium Generale I" offers students the opportunity to take courses outside of their curriculum and the result can be credited as an elective subject. In principle, all IU bachelor courses that fulfill the following requirements are creditable for this purpose:
  - They are not part of an integral part of the applicable mandatory curriculum.
  - They do not have admission requirements or students can prove that they have met the admission requirement.
- The examination of the selected courses must be taken in full and finally passed in order to be credited as part of the 'Studium Generale' .

Literature

Compulsory Reading

Further Reading

- See course description of the selected course

Study Format Distance Learning

Study Format	Course Type
Distance Learning	See Selected Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	See Selected Course

Student Workload

Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
0 h	0 h	0 h	0 h	0 h	0 h

Instructional Methods
See Selected Course

Studium Generale II

Course Code: DLBSG02_E

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

Course Description

In the course "Studium Generale II", students deepen their knowledge in a self-selected subject area by completing an IU course outside their applicable curriculum. This gives them the opportunity to look beyond their own subject area and acquire further competencies. The associated option enables students to self-determine their study content to focus even more on issues relevant to them and/or to strengthen or develop selected competencies.

Course Outcomes

On successful completion, students will be able to

- apply acquired key competencies to issues in their field of study and/or in their professional environment.
- to deepen one's own skills and abilities in a self-directed manner.
- to look beyond the boundaries of their own area of expertise.

Contents

- The course "Studium Generale II" offers students the opportunity to take courses outside of their curriculum and the result can be credited as an elective subject. In principle, all IU bachelor courses that fulfill the following requirements can be chosen for this purpose:
  - They are not part of an integral part of the applicable mandatory curriculum.
  - They do not have admission requirements or students can prove that they have met the admission requirement.
- The examination of the selected courses must be taken in full and finally passed in order to be credited as part of the 'Studium Generale' .

Literature

Compulsory Reading

Further Reading

- See course description of the selected course

Study Format Distance Learning

Study Format	Course Type
Distance Learning	See Selected Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	See Selected Course

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
0 h	0 h	0 h	0 h	0 h	0 h

Instructional Methods
See Selected Course

Project: Salesforce Platform Management

Module Code: DLSFPM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Thomas Bolz (Project: Salesforce Fundamentals) / Prof. Dr. Thomas Bolz (Project: CRM with Salesforce Service Cloud)

Contributing Courses to Module

- Project: Salesforce Fundamentals (DLSFPM01)
- Project: CRM with Salesforce Service Cloud (DLSFPM02)

Module Exam Type

Module Exam	Split Exam
	Project: Salesforce Fundamentals • Study Format "Distance Learning": Written Assessment: Project Report Project: CRM with Salesforce Service Cloud • Study Format "Distance Learning": Oral Project Report

Weight of Module
see curriculum

Module Contents

Project: Salesforce Fundamentals

Using the learning platform trailhead students will learn the fundamentals of Salesforce. At the end of the course students will be able to administer the Salesforce platform. This module prepares them for the Salesforce administrator certification.

Project: CRM with Salesforce Service Cloud

Using the learning platform trailhead students will learn how to manage customer relationships with Salesforce platform. At the end of the course they will be able to manage the Salesforce service cloud. This module prepares students for the Salesforce service cloud certification.

Learning Outcomes

Project: Salesforce Fundamentals

On successful completion, students will be able to

- define what Salesforce and customer relationship management is.
- describe and compare the different options for importing and exporting data in Salesforce.
- create reports and visualize key business metrics in real-time in Salesforce.
- create a simple Salesforce app.
- control access to data using security tools in Salesforce.

Project: CRM with Salesforce Service Cloud

On successful completion, students will be able to

- set up customer service with Salesforce service cloud.
- lead a customer service team in the digital era.
- create digital engagement on multiple channels.
- define service cloud goals and metrics.
- automate case management.
- improve customer service using artificial intelligence.

Links to other Modules within the Study Program	Links to other Study Programs of the University
This module is similar to other modules in the fields of Marketing & Sales	All Bachelor Programmes in the Marketing & Communication fields

Project: Salesforce Fundamentals

Course Code: DLSFPM01

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

Course Description
Salesforce is the most used software solution for customer relationship management worldwide. Using the learning platform trailhead students will learn independently the fundamentals of Salesforce. The course introduces Salesforce and explains how to administrate it. Additionally, it presents essentials of the Salesforce platform.
Course Outcomes
On successful completion, students will be able to ▪ define what Salesforce and customer relationship management is. ▪ describe and compare the different options for importing and exporting data in Salesforce. ▪ create reports and visualize key business metrics in real-time in Salesforce. ▪ create a simple Salesforce app. ▪ control access to data using security tools in Salesforce.
Contents
▪ The content on the learning platform focuses on the features and the functionality used to maintain a Salesforce implementation. It provides general knowledge of the features available to end users and the configuration options available to a Salesforce administrator. Furthermore, the content enables to maintain a Salesforce organization, respond to common business requirements, and perform administrative functions using current Salesforce features.

Literature
Compulsory Reading
Further Reading ▪ Eason, J. (2014): Android Studio 1.0. (URL: http://android-developers.blogspot.de/2014/12/android-studio-10.html [accessed: 22.04.2016]).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Project: CRM with Salesforce Service Cloud

Course Code: DLSFPM02

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

Course Description
This course facilitates key aspects of setting up customer service with Salesforce service cloud on the learning platform trailhead. The course describes how to implement Salesforce service cloud and manage it. It enables to make better business decisions based on customer service data and to create a service metrics strategy. The course shows how to create processes to help support teams become more efficient and manage large data volumes within Salesforce and prepares students for the Salesforce service cloud certification.
Course Outcomes On successful completion, students will be able to ▪ set up customer service with Salesforce service cloud. ▪ lead a customer service team in the digital era. ▪ create digital engagement on multiple channels. ▪ define service cloud goals and metrics. ▪ automate case management. ▪ improve customer service using artificial intelligence.
Contents ▪ The content on the learning platform focuses on designing and deploying solutions that support customer business processes and requirements using Salesforce applications. The content enables to design solutions using the Service Cloud functionality and to lead the implementation of these solutions within a customer organization.

Literature
Compulsory Reading
Further Reading ▪ Eason, J. (2014): Android Studio 1.0. (URL: http://android-developers.blogspot.de/2014/12/android-studio-10.html [accessed: 22.04.2016]).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Oral Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

AWS Cloud Specialization

Module Code: DLBAWSCLSP

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Georgi Dimchev (Project: AWS - Cloud Essentials) / Prof. Dr. Tianxiang Lu (Project: AWS - Cloud Advanced)

Contributing Courses to Module
▪ Project: AWS - Cloud Essentials (DLBPAWSCLES01) ▪ Project: AWS - Cloud Advanced (DLBPAWSCLAD01)

Module Exam Type	
Module Exam	**Split Exam** Project: AWS - Cloud Essentials • Study Format "Distance Learning": Written Assessment: Project Report Project: AWS - Cloud Advanced • Study Format "Distance Learning": Written Assessment: Project Report

Weight of Module
see curriculum

Module Contents

Project: AWS - Cloud Essentials

Students will learn the foundational concepts and services of Amazon Web Services (AWS), covering its core infrastructure services including computing, storage, and networking through practical experience. Emphasis is placed on practical skills for deploying Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) solutions.

Project: AWS - Cloud Advanced

This course offers advanced understanding of AWS, with a particular emphasis on specialized areas such as Solutions Architecture, Compliance & Security, and AI & Machine Learning. Students will acquire hands-on expertise in these areas, with the goal of enabling them to deploy laaS, Paas, or SaaS workloads using AWS, effectively tackle real-life interdisciplinary challenges, and confidently handle service configurations within the AWS cloud console.

Learning Outcomes	
Project: AWS - Cloud Essentials On successful completion, students will be able to ▪ understand the core services of AWS including compute, network, databases, and storage, deployment models (on-premises, hybrid, and vpc). ▪ explain the shared responsibility model, describe the basic global infrastructure and core security services. ▪ describe the AWS Well-Architected Framework and the basics of AWS Cloud Migration. ▪ get familiar with the terminology and concepts related to AWS Services, the AWS Management Console, AWS security measures, IAM and AWS networking services. ▪ apply and manage core service settings within the AWS cloud console effectively. ▪ assess data storage services in AWS to meet various application needs. ▪ plan and implement a scenario-based serverless service for small or medium-sized companies. ▪ configure basic network security using Amazon CloudWatch monitoring features for simple use cases in AWS, ensuring secure cloud operations. ▪ critically examine the core billing, account management, and pricing models and explain how to use pricing tools to make cost-effective choices for AWS services. **Project: AWS - Cloud Advanced** On successful completion, students will be able to ▪ understand and articulate the core services provided by AWS within chosen specialization tracks, including Solutions Architect, Compliance & Security, and AI & Machine Learning. ▪ critically examine the pros and cons of developing and deploying real-world scenarios using AWS IaaS, PaaS, vs. SaaS and public, private or hybrid deployment demonstrating a clear grasp of the necessary service and deployment intricacies. ▪ manage and configure profound service settings within the AWS cloud console, showing depth in technical proficiency and operational capabilities. ▪ critically assess, test and monitor the effect of different AWS deployment features, addressing interdisciplinary challenges through the appropriate use of AWS cloud services in realistic use cases. ▪ assess and critically reflect on AWS-based solutions, considering industry compliance and security requirements, ensuring a robust understanding of the legal and regulatory framework. ▪ apply and implement machine learning and artificial intelligence concepts using AWS to solve real-world problems, demonstrating innovative thinking and practical application of theoretical knowledge.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Development	**Links to other Study Programs of the University** All Bachelor Programs in the IT & Technology field

Project: AWS - Cloud Essentials

Course Code: DLBPAWSCLES01

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

Course Description

Amazon Web Services (AWS) is a comprehensive cloud computing platform provided by Amazon that offers scalable computing power, storage, and various other functionalities to help businesses and individuals deploy applications and manage data efficiently. It reduces the need for physical hardware, thus lowering costs and increasing flexibility by allowing users to access services and resources on-demand from anywhere in the world. This service is highly relevant for daily life and business as it supports a wide range of applications and services, from hosting websites to supporting IoT devices and big data analytics, ultimately facilitating innovation, scalability, and global operations.This course prepares students for the AWS Cloud Practitioner Certificate, providing a foundational understanding of AWS core services. Students will learn to articulate the benefits and use cases of AWS IaaS, PaaS, and SaaS, and grasp the basics of public, private, and hybrid cloud deployments. The course emphasizes practical skills in managing and configuring AWS services, ensuring students can effectively navigate the AWS cloud console. It lays the groundwork for critical assessments of AWS deployment features, addressing compliance and security requirements, and preparing students for more advanced AWS certifications and applications

Course Outcomes

On successful completion, students will be able to

- understand the core services of AWS including compute, network, databases, and storage, deployment models (on-premises, hybrid, and vpc).
- explain the shared responsibility model, describe the basic global infrastructure and core security services.
- describe the AWS Well-Architected Framework and the basics of AWS Cloud Migration.
- get familiar with the terminology and concepts related to AWS Services, the AWS Management Console, AWS security measures, IAM and AWS networking services.
- apply and manage core service settings within the AWS cloud console effectively.
- assess data storage services in AWS to meet various application needs.
- plan and implement a scenario-based serverless service for small or medium-sized companies.
- configure basic network security using Amazon CloudWatch monitoring features for simple use cases in AWS, ensuring secure cloud operations.
- critically examine the core billing, account management, and pricing models and explain how to use pricing tools to make cost-effective choices for AWS services.

Contents
▪ This course offers a comprehensive exploration of Amazon Web Services (AWS), focusing on its core services such as computing, networking, databases, and storage solutions. Students will delve into the AWS shared responsibility model, understand the global infrastructure, and learn about the integral security services provided. This also covers the AWS Well-Architected Framework and an introduction of the fundamentals for cloud migration strategies. Through hands-on exercises, students will gain proficiency in managing AWS environments using the AWS Management Console and implement security measures via AWS Identity and Access Management (IAM) and network services. Additionally, the course emphasizes the importance of cost management, enabling students to critically analyze AWS pricing models to make informed financial decisions for cloud-based solutions.

Literature
Compulsory Reading
Further Reading ▪ AWS Training and Certification Skill Builder. (2024). AWS Cloud Practitioner Essentials (7 hours). ▪ AWS Training and Certification Skill Builder. (2024). AWS Cloud Quest: Cloud Practitioner. ▪ AWS Training and Certification Skill Builder. (2024). AWS Technical Essentials (4 hours). ▪ AWS Training and Certification Skill Builder. (2024). Serverless – Knowledge Badge Readiness Path (13 hours). ▪ AWS Training and Certification Skill Builder. (2024). Standard Exam Prep Plan: AWS Certified Cloud Practitioner (CLF-C02) (18 hours).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	**Learning Material** ☑ Slides	**Exam Preparation** ☑ Guideline

Project: AWS - Cloud Advanced

Course Code: DLBPAWSCLAD01

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

Course Description

AWS (Amazon Web Services) is a comprehensive cloud computing platform provided by Amazon that offers scalable computing power, storage, and various other functionalities to help businesses and individuals deploy applications and manage data efficiently. It reduces the need for physical hardware, thus lowering costs and increasing flexibility by allowing users to access services and resources on-demand from anywhere in the world. This service is highly relevant for daily life and business as it supports a wide range of applications and services, from hosting websites to supporting IoT devices, big data analytics and machine learning, ultimately facilitating innovation, scalability, and global operations. The course prepares students for the AWS Cloud Solution Architect Professional Certificate. It dives deeper into AWS core services, focusing on sophisticated deployment and management techniques. Students will critically examine and apply real-world scenarios using AWS IaaS, PaaS, and SaaS, and navigate complex deployment models. They will gain technical proficiency in managing advanced service settings within the AWS cloud console and address interdisciplinary challenges through hands-on practice. Additionally, the course covers assessing AWS solutions for compliance and security, ensuring robust understanding of legal frameworks. Students will also implement machine learning and AI concepts to solve real-world problems, fostering innovative thinking and practical application, and preparing them for the dynamic demands of the tech industry.

Course Outcomes

On successful completion, students will be able to

- understand and articulate the core services provided by AWS within chosen specialization tracks, including Solutions Architect, Compliance & Security, and AI & Machine Learning.
- critically examine the pros and cons of developing and deploying real-world scenarios using AWS IaaS, PaaS, vs. SaaS and public, private or hybrid deployment demonstrating a clear grasp of the necessary service and deployment intricacies.
- manage and configure profound service settings within the AWS cloud console, showing depth in technical proficiency and operational capabilities.
- critically assess, test and monitor the effect of different AWS deployment features, addressing interdisciplinary challenges through the appropriate use of AWS cloud services in realistic use cases.
- assess and critically reflect on AWS-based solutions, considering industry compliance and security requirements, ensuring a robust understanding of the legal and regulatory framework.
- apply and implement machine learning and artificial intelligence concepts using AWS to solve real-world problems, demonstrating innovative thinking and practical application of theoretical knowledge.

Contents

- This course ensures students gain a comprehensive understanding of AWS, specializing in Solutions Architect, Compliance & Security, and AI & Machine Learning. They will articulate core AWS services and critically examine the pros and cons of deploying real-world scenarios using AWS IaaS, PaaS, SaaS, and different deployment models (public, private, hybrid).
- Students will manage and configure service settings within the AWS cloud console, demonstrating technical proficiency. They will assess, test, and monitor AWS deployment features, addressing interdisciplinary challenges using realistic use cases. Additionally, students will evaluate AWS-based solutions for industry compliance and security, understanding the legal and regulatory frameworks.
- The course also covers applying machine learning and AI concepts using AWS to solve real-world problems, encouraging innovative thinking and practical application. This approach prepares students to excel in cloud architecture, compliance protocols, security measures, and AI-driven problem-solving, ensuring readiness for the tech industry's dynamic demands.

Literature
Compulsory Reading
Further Reading ▪ AWS Training and Certification Skill Builder. (2024). AWS Solutions Architect – Knowledge Badge Readiness Path (51 hours). ▪ AWS Training and Certification Skill Builder. (2024). Generative AI Learning Plan for Developers (12 hours). ▪ AWS Training and Certification Skill Builder. (2024). Online Course Supplement: Practical Data Science with Amazon SageMaker (1 day).

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Project

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
120 h	0 h	30 h	0 h	0 h	150 h

Instructional Methods		
Tutorial Support	**Learning Material**	**Exam Preparation**
☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions	☑ Slides	☑ Guideline

Internship

Module Code: FSINTER

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

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

Module Coordinator

Prof. Dr. Andreas Simon (Internship)

Contributing Courses to Module

- Internship (FSINTER01)

Module Exam Type	
Module Exam Study Format: Distance Learning Internship Reflection Paper (passed / not passed)	**Split Exam**
Weight of Module see curriculum	

Module Contents

Internship according to the Internship Regulations of the IU.

Learning Outcomes	
Internship On successful completion, students will be able to ▪ apply skills and knowledge they have obtained previously during their study program in an entrepreneurial environment. ▪ develop his / her practical and analytical skills in order to improve his / her employability. ▪ have practical knowledge and learn to work within an organization. ▪ acquire a first deep insight into organizational structures and communication procedures. ▪ apply comminication skills, socials skills, problem solving, time and project management which will shape their general management skills. ▪ shape their personality with the help of the interdisciplinary nature of the course especially in the area of the key qualifications like interpersonal skills or intercultural skills.	
Links to other Modules within the Study Program Builds on modules of the chosen degree program	**Links to other Study Programs of the University** All myStudies programs

Internship

Course Code: FSINTER01

Study Level	Language of Instruction and Examination	Contact Hours	CP	Admission Requirements
	English		10	None

Course Description
This module consists of two parts: (1) preparation tutorials and (2) the internship itself. During the preparation tutorials, students will learn about the intention of the internship and about the intellectual as well as social requirements of the working environment.

Course Outcomes

On successful completion, students will be able to

- apply skills and knowledge they have obtained previously during their study program in an entrepreneurial environment.
- develop his / her practical and analytical skills in order to improve his / her employability.
- have practical knowledge and learn to work within an organization.
- acquire a first deep insight into organizational structures and communication procedures.
- apply comminication skills, socials skills, problem solving, time and project management which will shape their general management skills.
- shape their personality with the help of the interdisciplinary nature of the course especially in the area of the key qualifications like interpersonal skills or intercultural skills.

Contents

- Internship according to the Internship Regulations of the IU.

Literature

Compulsory Reading

Further Reading

- Sweitzer, F. H. & King, M. A. (2009). The Successful Internship: Personal, Professional, and Civic Development. 3rd ed.. Cengage. ISBN: 0-495-59642-6.
- Kaser, K., Brooks, J. R. & Brooks, K. (2007). Making the Most of your Internship. Thomson. ISBN: 0-538-44432-0.

Study Format Distance Learning

Study Format	Course Type
Distance Learning	

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Internship Reflection Paper (passed / not passed)

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
0 h	0 h	0 h	0 h	300 h	300 h

Instructional Methods
Tutorial Support ☑ Course Feed ☑ Intensive Live Sessions/Learning Sprint ☑ Recorded Live Sessions

Project: Agile Project Management

Module Code: CSEBCSAPM

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Inga Schlömer (Project: Agile Project Management)

Contributing Courses to Module
▪ Project: Agile Project Management (CSEBCSAPM01)

Module Exam Type	
Module Exam Study Format: Campus Studies 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	
Project: 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. ▪ consider the increasing relevance of international, intercultural and virtual collaboration in projects.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Development	**Links to other Study Programs of the University** All Bachelor Programs in the IT & Technology field

Project: Agile Project Management

Course Code: CSEBCSAPM01

Study Level	Language of Instruction and Examination	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.
- consider the increasing relevance of international, intercultural and virtual collaboration in projects.

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 ▪ Apress. Agile Alliance (2021). Subway Map to Agile Practices. ▪ Beck, K. et al. (2001). Manifesto for Agile Software Development. ▪ Chovanova, H. et al. (2020). Agile Project Management – What is It? Publisher: IEEE. In 18th International Conference on Emerging eLearning Technologies and Applications (ICETA), Emerging eLearning Technologies and Applications (ICETA), 2020 18th International Conference. ▪ Dalton, Jeff (2019). Great Big Agile. An OS for Agile Leaders. ▪ Douglass, B. P. (2016). Agile systems engineering. Morgan Kaufmann, p. 151-160. ▪ Hohl, P., Klünder, J., van Bennekum, A., Lockard, R., Gifford, J., Münch, J., Stupperich, M., & Schneider, K. (2018). Back to the future: origins and directions of the “Agile Manifesto” – views of the originators. Journal of Software Engineering Research and Development, 6(1). ▪ Project Management Institute (2017). Agile Practice Guide. Project Management Institute. ▪ Measey P., Radtac (2015). Agile Foundations - Principles, Practices and Frameworks. BCS The Chartered Institute for IT, p. 131-140, p. 148-152. ▪ Schwaber, K., Sutherland, J. (2020). The Scrum Guide. ▪ Hohl, P., Klünder, J., van Bennekum, A., Lockard, R., Gifford, J., Münch, J., Stupperich, M., & Schneider, K. (2018). Back to the future: origins and directions of the “Agile Manifesto” – views of the originators. Journal of Software Engineering Research and Development, 6(1).

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	Mandatory attendance of at least 60% of the lectures
Type of Exam	Written Assessment: Project Report

Student Workload					
Self Study	Contact Hours	Tutorial/Tutorial Support	Self Test	Independent Study	Hours Total
114 h	36 h	0 h	0 h	0 h	150 h

IT Law

Module Code: CSEBCSIITL

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator

Prof. Dr. Brian Gannon (IT Law)

Contributing Courses to Module

- IT Law (CSEBCSIITL01)

Module Exam Type

Module Exam	Split Exam
Study Format: Campus Studies Written Assessment: Case Study	

Weight of Module

see curriculum

Module Contents

- Basic Concepts of Legal Systems
- Internet and Domain Law
- Contracts
- Intellectual Property
- Data Protection / Privacy

Learning Outcomes	
IT Law On successful completion, students will be able to ▪ describe basic concepts of IT law. ▪ provide examples of different approaches to IT law in different countries. ▪ identify legal questions as they arise in IT. ▪ apply the core ideas of data protection and privacy in their work. ▪ distinguish the different types of contracts and intellectual property as they relate to IT.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Developement	**Links to other Study Programs of the University** All Bachelor Programs in the IT & Technology field

IT Law

Course Code: CSEBCSIITL01

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

Course Description

The application of IT is embedded in a legal framework which computer scientists need to know and adhere to in their work. This applies to the way their own work is performed which, for example, may be governed by contracts with suppliers and/or customers. Computer scientists create and use intellectual property, and this leads to questions of copyright, software patents, etc. Beyond this, IT strongly influences the social environment and therefore needs to abide by regulations such as data protection. The goal of this module is to provide students with a basic understanding of these legal aspects so they can take them into account, apply them in simple cases, and recognize when more specialised legal knowledge is required. Since IT is a topic that connects different countries and legal frameworks, the course looks at some of the common legal questions as they are handled in the European Union, the USA, and India.

Course Outcomes

On successful completion, students will be able to

- describe basic concepts of IT law.
- provide examples of different approaches to IT law in different countries.
- identify legal questions as they arise in IT.
- apply the core ideas of data protection and privacy in their work.
- distinguish the different types of contracts and intellectual property as they relate to IT.

Contents

1. Basic Concepts of Legal Systems
   - 1.1 The Role of Law in IT
   - 1.2 Basic Concepts of the Legal System in the European Union
   - 1.3 Basic Concepts of the Legal System in the USA
   - 1.4 Basic Concepts of the Legal System in India

2. Internet and Domain Law
   - 2.1 Web Sites and the Law
   - 2.2 Net Neutrality
   - 2.3 Domain Registration
   - 2.4 Internet Crime

3. Contracts
    - 3.1 Types of IT Contracts
    - 3.2 Electronic Contracts and Electronic Signatures
    - 3.3 Licences
    - 3.4 Free and Open Source Software
    - 3.5 Buying and Selling Off-the-Shelf Software
    - 3.6 Software Development Contracts

4. Intellectual Property
    - 4.1 Brands, Trade Marks and Domain Names
    - 4.2 Copyright
    - 4.3 Software Patents
    - 4.4 Digital and Data Ownership

5. Data Protection/Privacy
    - 5.1 Basic Concepts of Data Protection
    - 5.2 Data Protection in the European Union: the GDPR
    - 5.3 Data Protection in the USA
    - 5.4 Data Protection in India
    - 5.5 Trans-Border Data Flows

Literature

Compulsory Reading

Further Reading

- Hoeren, T., & Pinelli, S. (2018). Agile programming – Introduction and current legal challenges. Computer Law & Security Review, 34(5), pp. 1131-1138. Retrieved from www.uni-muenster.de/Jura.itm/hoeren/itm/wp-content/uploads/Hr.-Hoeren-29.10.pdf
- Lloyd, I. (2018). Information technology law (8th ed.). Oxford: Oxford University Press.
- Murray, A. (2019). Information technology law: The law and society (4th ed.). Oxford: Oxford University Press.
- Soma, J. T. (2014). Privacy law in a nutshell. St. Paul, MN: West Academic.
- Wikia.org. (n.d.). The IT law wiki [web encyclopedia]. Retrieved from https://itlaw.wikia.org/wiki/The_IT_Law_Wiki#

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Written Assessment: Case Study

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
94 h	36 h	0 h	20 h	0 h	150 h

Instructional Methods	
Learning Material	**Exam Preparation**
☑ Course Book	☑ Online Tests
☑ Video	☑ Guideline
☑ Slides	

Computer Science and Society

Module Code: CSEBCSCSAS

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 and Examination
see curriculum	Minimum 1 semester	WiSe/SoSe	English

Module Coordinator
Prof. Dr. Janki Dodiya (Computer Science and Society)

Contributing Courses to Module
▪ Computer Science and Society (CSEBCSCSAS01)

Module Exam Type	
Module Exam Study Format: Campus Studies Written Assessment: Written Assignment	**Split Exam**
Weight of Module see curriculum	

Module Contents

- The role of computer science
- The impact of the information society on the economy and society
- Infrastructure vulnerability
- Informatics and the military
- Responsibility in Information Technology

Learning Outcomes	
Computer Science and Society On successful completion, students will be able to ▪ name significant stages of development in computer science and the Internet. ▪ describe the role of computer science as a science and its relation to other sciences. ▪ explain and discuss the main economic and social implications of the information society. ▪ explain and discuss the causes and effects of infrastructure vulnerability. ▪ discuss and apply relevant ethical principles to issues in computer science.	
Links to other Modules within the Study Program This module is similar to other modules in the field of Computer Science & Software Development.	**Links to other Study Programs of the University** All Bachelor Programs in the IT & Technology field.

Computer Science and Society

Course Code: CSEBCSCSAS01

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

Course Description

Computer science is a science that shapes society in a special way, and thus has a significant impact on society. Depending on its application and prevailing conditions, it can help to improve society and living conditions or cause and exacerbate surveillance, unemployment, and other social problems. In many cases, it is not the results of computer science itself that are "good" or "bad”, but the results can be used to serve very different purposes ("dual use"). In this module students acquire the basic tools to understand the effects of computer science in general and its effects on their everyday work as a data scientist.

Course Outcomes

On successful completion, students will be able to

- name significant stages of development in computer science and the Internet.
- describe the role of computer science as a science and its relation to other sciences.
- explain and discuss the main economic and social implications of the information society.
- explain and discuss the causes and effects of infrastructure vulnerability.
- discuss and apply relevant ethical principles to issues in computer science.

Contents

1. Introduction
   - 1.1 Computer Science, Society, and the Information Society
   - 1.2 Historical Overview of Computer Science and the Internet
   - 1.3 What is Computer Science?
   - 1.4 Relevant Organizations

2. The Role of Data in the Information Society
   - 2.1 Data as a Commodity
   - 2.2 Data Protection and Data Spying
   - 2.3 Long-Term Archiving

3. Economic Impacts of the Information Society
   - 3.1 Globalization and the Formation of Monopolies in the Economy
   - 3.2 Open Movement

3.3 Change in the Labor Market
3.4 Intellectual Property

4. Social impacts of the Information Society
   4.1 Social Networks
   4.2 Surveillance
   4.3 Digitization of Education
   4.4 Women in Computer Science

5. Infrastructure Vulnerability
   5.1 Attacks and Accidents
   5.2 Technical Infrastructure
   5.3 Political and Social Infrastructure

6. Computer Science and the Military
   6.1 Military as the Driver of Computer Science
   6.2 Cyber War
   6.3 Dual Use

7. Responsibility in Computer Science
   7.1 Ethics of Responsibility According to Jonas
   7.2 Ethical Guidelines for Computer Science in Society
   7.3 Decision-making by Algorithms
   7.4 Mechanisms for Implementing Responsibility in Computer Science

Literature

Compulsory Reading

Further Reading

- Clegg, B. (2017): Big Data. How the Information Revolution is Transforming Our Lives. Icon Books.

Study Format Campus Studies

Study Format	Course Type
Campus Studies	Campus Lecture

Information about the examination	
Examination Admission Requirements	
Type of Exam	Written Assessment: Written Assignment

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
94 h	36 h	0 h	20 h	0 h	150 h

Instructional Methods	
Learning Material ☑ Course Book ☑ Video ☑ Slides	**Exam Preparation** ☑ Online Tests ☑ Guideline

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 and Examination
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** <u>Bachelor Thesis</u> • Study Format "Distance Learning": Bachelor Thesis <u>Colloquium</u> • Study Format "Distance Learning": Colloquium
Weight of Module see curriculum	

Module Contents
Bachelor Thesis ▪ Bachelor's thesis ▪ Colloquium on the bachelor's thesis **Colloquium**
Learning Outcomes
Bachelor Thesis 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. **Colloquium** 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).

Links to other Modules within the Study Program	Links to other Study Programs of the University
All modules in the Bachelor program	All Bachelor Programs in distance learning

Bachelor Thesis

Course Code: DLBBT01

Study Level	Language of Instruction and Examination	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 ▪ Lipson, C. (2018). How to write a BA thesis. A practical guide from your first ideas to your finished paper (2nd ed.). University of Chicago Press. ▪ Turabian, K. L. (2013). A Manual for Writers of Research Papers, theses, and dissertations (8th ed.). University of Chicago Press. ▪ Selection of literature according to topic

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Thesis Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Bachelor Thesis

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
270 h	0 h	0 h	0 h	0 h	270 h

Instructional Methods

Colloquium

Course Code: DLBBT02

Study Level	Language of Instruction and Examination	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

- Subject specific literature chosen by the student

Study Format Distance Learning

Study Format	Course Type
Distance Learning	Thesis Course

Information about the examination	
Examination Admission Requirements	**Online Tests:** no
Type of Exam	Colloquium

Student Workload					
Self Study	**Contact Hours**	**Tutorial/Tutorial Support**	**Self Test**	**Independent Study**	**Hours Total**
30 h	0 h	0 h	0 h	0 h	30 h

Instructional Methods