Course Handbook Computer Science and Web Engineering Bachelor

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Computer Science and Web Engineering Bachelor - mandatory courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Bachelor Colloquium	DFIW-BK	S610-0212	6	-	3	Studienleitung
Bachelor Thesis	DFIW-BT	T610-0211	6	-	12	Studienleitung
Computer Networks	DFIW-RN	P610-0192	4	2V+2P	5	Prof. Dr. Steffen Knapp
Databases	DFIW-DB	P610-0183	3	3V+1P	5	Prof. Dr. Klaus Berberich
English 3	DFIW-305	P610-0179	3	2VU	2	Dr. Julia Frisch
English 4	DFIW-405	P610-0186	4	2VU	2	Dr. Julia Frisch
French 3	DFIW-302	P610-0180	3	4VU	4	Dr. Julia Frisch
French 4	DFIW-402	P610-0187	4	4VU	4	Dr. Julia Frisch
German 3	DFIW-301	P610-0178	3	4VU	4	Dr. Julia Frisch
German 4	DFIW-401	P610-0185	4	4VU	4	Dr. Julia Frisch
Information Retrieval	DFIW-IRET	P610-0540	3	2V+2PA	5	Prof. Dr. Klaus Berberich
Intercultural Management 3	DFIW-304	P610-0181	3	2VU	2	Dr. Julia Frisch
	DFIW-404		4	2VU	2	Dr. Julia Frisch

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Intercultural Management 4		P610-0188, P620-0006				
Operating Systems	DFIW-BS	P610-0191	4	2V+2P	5	Prof. Dr. Steffen Knapp
Programming 1	DFIW-PRG1	P610-0182	3	4V+2P	8	Prof. Dr.-Ing. Martin Burger
Programming 2	DFIW-PRG2	P610-0190	4	4V+2P	8	Prof. Dr. Markus Esch
Programming Tools	DFIW-PWZ	P610-0193	4	2V+2P	5	Prof. Dr. Reinhard Brocks
Security Engineering	DFIW-SE	P610-0194	4	2V+2P	5	Prof. Dr. Damian Weber
Work Experience Phase	DFIW-PRA	S610-0210	6	-	15	Studienleitung

(19 modules)

Computer Science and Web Engineering Bachelor - optional courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Spanish 3	DFIW-306	P610-0626	3	4VU	4	Dr. Julia Frisch
Spanish 4	DFIW-406	P610-0627	4	4VU	4	Dr. Julia Frisch

(2 modules)

Computer Science and Web Engineering Bachelor - mandatory courses

Bachelor Colloquium

Module name (EN): Bachelor Colloquium
Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019
Module code: DFIW-BK
Hours per semester week / Teaching method: -
ECTS credits: 3
Semester: 6
Mandatory course: yes
Language of instruction: German
Assessment: Oral presentation [*updated 26.02.2018*]
Applicability / Curricular relevance: DFIW-BK (S610-0212) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 6, mandatory course KIB-BAK (S222-0006) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course KIB-BAK (S222-0006) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course PIB-BK (S221-0010) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course PRI-BK (S223-0001) Production Informatics, Bachelor, SO 01.10.2023 , semester 6, mandatory course
Workload: The total student study time for this course is 90 hours.
Recommended prerequisites (modules): None.
Recommended as prerequisite for:
Module coordinator: Studienleitung
Lecturer: Studienleitung [*updated 09.08.2020*]

Learning outcomes:
Students
_ will be able to analyze comprehensive material independently.
_ will be able to summarize complex interrelationships and present them in a professional manner.
_ will also be able to answer more detailed questions on the subject areas of their Bachelor thesis competently.

[*updated 26.02.2018*]

Module content:
The goal of the Bachelor colloquium is to present and explain the results and content of the Bachelor thesis orally and to verify that the work was done independently.

[*updated 26.02.2018*]

Recommended or required reading:
Literature listed in the respective Bachelor thesis.

[*updated 26.02.2018*]

Bachelor Thesis

Module name (EN): Bachelor Thesis

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-BT

Hours per semester week / Teaching method:
-

ECTS credits:
12

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Written composition

[*updated 26.02.2018*]

Applicability / Curricular relevance:

DFIW-BT (T610-0211) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 6, mandatory course
KIB-BAT (T222-0005) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 ,

semester 6, mandatory course
KIB-BAT (T222-0005) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course
PIB-BT (T221-0008) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course
PRI-BT (T223-0001) Production Informatics, Bachelor, SO 01.10.2023 , semester 6, mandatory course

Workload:
The total student study time for this course is 360 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer: Studienleitung

[*updated 09.08.2020*]

Learning outcomes:
Students
_ will be able to work independently on given (medium to difficult) subject-specific tasks within a given period of time using scientific methods.
_ will be capable of using the specialist knowledge and methods acquired during their studies to develop ways to select suitable solutions in a goal- and result-oriented manner.
_ will be able to analyze topics in cooperation with external and internal clients and colleagues, conceive their solution and implement them accordingly.
And lastly, students will be able to document the results of their work in writing according to scientific principles.

[*updated 26.02.2018*]

Module content:
The Bachelor thesis is a project from the field of research, industry or business. It is of a theoretical, programming, empirical and/or experimental nature. Students must document their thesis (or collaboration) in the project. The application-oriented, industrial project aspect (project plan, project implementation, project result) of the thesis will be taken into account.

[*updated 26.02.2018*]

Recommended or required reading:
Will be specified by the supervisor resp. researched independently based on a specific topic.

[*updated 26.02.2018*]

Computer Networks

Module name (EN): Computer Networks

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-RN

Hours per semester week / Teaching method:
2V+2P (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 26.02.2018*]

Applicability / Curricular relevance:

BMT2551.RN Biomedical Engineering, Bachelor, ASPO 01.10.2018 , optional course, medical/technical
BMT2551.RN Biomedical Engineering, Bachelor, SO 01.10.2025 , optional course, medical/technical
DFIW-RN (P610-0192) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
KIB-RN (P222-0037) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
KIB-RN (P222-0037) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 3, mandatory course
PIB-RN (P221-0038) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 4, mandatory course
PRI-RN (P222-0037) Production Informatics, Bachelor, SO 01.10.2023 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Steffen Knapp

Lecturer: Prof. Dr. Steffen Knapp

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this course, students will be familiar with the functionality and data structures of the basic Internet protocol families between LAN and application level. They will be able to describe the

communication in a TCP/IP computer network and use this knowledge for troubleshooting.

[*updated 26.02.2018*]

Module content:
1. Computer communication
1.1. Models
1.2. LAN
1.3. IP/ICMP
1.4. UDP
1.5. TCP

2. Selected application layer Internet protocols

3. Using network tools

[*updated 26.02.2018*]

Recommended or required reading:
Kurose, Ross, Computernetzwerke, Pearson, 2012
D. Comer, Computer Networks and Internets: Global Edition, Pearson, 2015

[*updated 26.02.2018*]

Databases

Module name (EN): Databases

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-DB

Hours per semester week / Teaching method:
3V+1P (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam, Duration 120 min.

[*updated 13.10.2024*]

Applicability / Curricular relevance:

DFBI-323 (P610-0219) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFIW-DB (P610-0183) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
KIB-DB (P222-0009) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 3, mandatory course
KIB-DB (P222-0009) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 3, mandatory course
PIB-DB (P221-0018) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 3, mandatory course
PRI-DB (P222-0009) Production Informatics, Bachelor, SO 01.10.2023 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Klaus Berberich

Lecturer: Prof. Dr. Klaus Berberich

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this module, students will be able to use relational database systems in practice. To do so, they will learn data modelling techniques and be able to apply them to problems in real life. Students will understand the relational model and relational algebra as the mathematical foundations of relational database systems. They will be capable of deriving a relational schema from a modelled section from the real world. Students will be able to assess its quality on the basis of relational normal forms (1NF, 2NF, 3NF) and improve it if necessary by converting it into a higher normal form. They will also be able to formulate concrete information requirements as expressions of relational algebra. Students will be familiar with the essential commands of the Structured Query Language (SQL) and can use them to change the schema of a database and the data stored in it. In addition, they will also be able to express a given need for information as a query in SQL and to understand and communicate a given SQL query. Students will understand the central concept of the transaction and can define each of the ACID properties and illustrate them with examples. They will be able to name different types of indexes in relational database systems and can use them depending on the situation. In order to solve more complex problems with the help of a relational database system, students will be familiar with the basic language components of procedural extensions (e. g. Oracle PL/SQL and Microsoft TransactSQL) of SQL. In addition, students will be familiar with interfaces (e. g. ODBC and JDBC) for accessing a relational database system from an application. They will be capable of accessing an existing relational database from a programming language known to them (e. g. Java, Python or C) by means of these interfaces. Finally, students will know alternatives to relational databases (e. g. document-oriented databases and graph databases) and can name differences.

[*updated 13.10.2024*]

Module content:
1. Introduction

2. Database design
3. Relational model and relational algebra
4. Structured Query Language (SQL)
5. Relational design theory
6. Data integrity
7. Transaction management
8. Database tuning
9. Security aspects
10. Programming with SQL
11. Database interfaces
12. Non-relational databases

[*updated 13.10.2024*]

Teaching methods/Media:
Transparencies, script, example databases in SQLite, practical and theoretical exercises.

[*updated 13.10.2024*]

Recommended or required reading:
Kemper Alfons und Eickler André: Datenbanksysteme - Eine Einführung, De Gruyter, 2015

Saake Gunter und Sattler Kai-Uwe: Datenbanken - Konzepte und Sprachen, mitp Professional, 2018

Wiese Lena: Advanced Data Management, De Gruyter, 2015

[*updated 13.10.2024*]

English 3

Module name (EN): English 3

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-305

Hours per semester week / Teaching method:
2VU (2 hours per week)

ECTS credits:
2

Semester: 3

Mandatory course: yes

Language of instruction:
English

Assessment:
60 h: Workshop 30 h - Independent learning 30 h

[*updated 15.04.2024*]

Applicability / Curricular relevance:

DFBGE-020 (P610-0026) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFBEES-305 (P610-0026) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
DFBGE-020 (P610-0026) Electrical Engineering, Bachelor, ASPO 01.10.2015 , semester 3, mandatory course
DFBGM309 Mechanical Engineering, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFBME-305 (P610-0315) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
DFBME-305 (P610-0315) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 3, mandatory course
DFBI-313 (P610-0228) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFIW-305 (P610-0179) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
DFIW-405 English 4

[*updated 29.04.2025*]

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
The initial level is B1, target level is B1+/lower B2.

After successfully completing this module, students will:

- be able to grasp the main ideas of complex texts on both concrete and abstract topics
- be able to follow technical discussions in his/her field of specialization.
- be able to express themselves clearly and in detail on a wide range of topics
- be able to explain points of view on a current issue, as well as state the advantages and disadvantages of various options
- have developed strategies and methods for compiling and summarizing important information in a presentation, an experimental setup or a technical lecture in English

[*updated 15.04.2024*]

Module content:

Introduction to the technical language used in technical standards and instructions
Discussion of topic-related specialist texts from the entire spectrum of the subject
Corporate structure (centralized and decentralized organizations)
Reading, describing, evaluating and creating graphics and tables

[*updated 15.04.2024*]

Teaching methods/Media:

The learning content is developed in a communicative and action-oriented manner with targeted listening, reading and speaking exercises in individual, partner and group work. A subject-related presentation on the course content is obligatory.

Short written or oral reviews of learning progress are possible at any time.

[*updated 15.04.2024*]

Recommended or required reading:
Literature and learning materials will be provided during the course

[*updated 15.04.2024*]

English 4

Module name (EN): English 4

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-405

Hours per semester week / Teaching method:
2VU (2 hours per week)

ECTS credits:
2

Semester: 4

Mandatory course: yes

Language of instruction:
English

Assessment:
Written exam (90 min.)

[*updated 04.12.2020*]

Applicability / Curricular relevance:

DFBGE-030 (P610-0032) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFBEES-405 (P610-0032) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
DFBGE-030 (P610-0032) Electrical Engineering, Bachelor, ASPO 01.10.2015 , semester 4, mandatory course
DFBGM409 Mechanical Engineering, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFBME-405 (P610-0320) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
DFBME-405 (P610-0320) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 4, mandatory course
DFBI-413 (P610-0232) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFIW-405 (P610-0186) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
DFIW-305 English 3

[*updated 29.04.2025*]

Recommended as prerequisite for:

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
After successfully completing this course, students will be able to pronunciate words correctly and speak well. They will have mastered an extensive general vocabulary. They will be able to use grammatical structures in English with confidence. Students will understand simple to moderately difficult general and specialized texts (reading comprehension, listening comprehension). According to the Common European Framework students will reach the B2/C1 level.

[*updated 04.12.2020*]

Module content:
Advanced grammar and vocabulary, such as past and future tenses, conditionals, gerunds, reported speech, prepositions, modal verbs Discussions about general and technical topics. Practical application. Translation of simple to intermediate sentences from German into English and vice versa. Regional studies.

[*updated 04.12.2020*]

Teaching methods/Media:
Text analysis, answering questions in oral and written form, presentations, role playing, discussions.

[*updated 04.12.2020*]

Recommended or required reading:
Copies from various sources (general and specialized texts, Raymond Murphy: Grammar in Use) as a script for students

[*updated 04.12.2020*]

French 3

Module name (EN): French 3

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-302

Hours per semester week / Teaching method:
4VU (4 hours per week)

ECTS credits:
4

Semester: 3

Mandatory course: yes

Language of instruction:
French

Assessment:
Written exam (50%) + presentation (25%) + tests (25%)

[*updated 08.01.2024*]

Applicability / Curricular relevance:

DFBI-312 (P610-0229) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFIW-302 (P610-0180) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
DFIW-402 French 4

[*updated 29.04.2025*]

Module coordinator:
Dr. Julia Frisch

Lecturer:
Maha Tischer, Diplômée de Maîtrise

[*updated 20.06.2024*]

Learning outcomes:
After successfully completing this module, students will:
have attained language skills at the lower and intermediate C1 level of the Common European Framework of Reference for Languages (CEFR) Skills - After successfully completing this module, students will be able to:

understand the global and detailed information in difficult texts pertaining to concrete and abstract topics,
follow factually complex technical discussions in their own field of expertise,
communicate using a wide range of linguistic means allowing them to conduct conversations with native speakers in an idiomatic and communicative manner,
express themselves in writing on a wide range of general and selected scholarly topics as comprehensibly and adequately as possible,
hold job and subject-oriented presentations and prepare the corresponding written materials in a linguistically appropriate manner and, to a great extent, error-free.

Competences - After successfully completing this module, students will:
have mastered the grammar relevant for the above skills, the basic and advanced general French vocabulary, the advanced French vocabulary and extensive coverage of the vocabulary relevant to their field of specialization,
be sensitive to the intercultural characteristics of countries belonging to the francophone world and thus, be able to successfully manage important communication situations in daily (business) life and -
be capable of embracing the intercultural differences of countries belonging to the francophone world and verbally interact there successfully.

[*updated 08.01.2024*]

Module content:
Maintain the extensive general French vocabulary acquired in previous levels of learning,
Advanced acquisition of an extensive vocabulary in an engineering-technical environment,
Advanced English grammar and awareness of its potential for use in technical language,
Pronounced communication skills with regard to scientific language in order to take part in discussions, hold presentations and write texts belonging to the most important scientifically-relevant text types on a high level,
Improve reading and listening comprehension skills through appropriate exercises.

[*updated 08.01.2024*]

Recommended or required reading:
Teaching materials compiled by the lecturer

[*updated 08.01.2024*]

French 4

Module name (EN): French 4

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-402

Hours per semester week / Teaching method:
4VU (4 hours per week)

ECTS credits:
4

Semester: 4

Mandatory course: yes

Language of instruction:
French

Assessment:
Written exam (50%) + presentation (25%) + tests (25%)

[*updated 04.12.2020*]

Applicability / Curricular relevance:

DFBGE-061 (P610-0034) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFBEES-402 (P610-0034) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
DFBGE-061 (P610-0034) Electrical Engineering, Bachelor, ASPO 01.10.2015 , semester 4, mandatory course
DFBGM408 Mechanical Engineering, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFBME-402 (P610-0321) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
DFBME-402 (P610-0321) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 4, mandatory course
DFBI-412 (P610-0233) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFIW-402 (P610-0187) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
DFIW-302 French 3

[*updated 29.04.2025*]

Recommended as prerequisite for:

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
- The foreign language will be taught with a subject-related approach.
- Subject-related, specialized grammar will be imparted to the students.
- After successfully completing this course, students will be able to understand intermediate newspaper and magazine articles from the French and francophone press.
- Students will be able to understand technically relevant, orally presented texts.
- They will have improved their writing skills.
- Students will be prepared for a possible career in a country where the target language is spoken.
- Students will have enlarged their technical vocabulary.

[*updated 04.12.2020*]

Module content:
- (Inter)culturally relevant, current topics pertaining to the countries in which the target language is spoken.
- Topics related to the students' lectures
- Specialized vocabulary within the context of the topics (subject areas) discussed
- Subject-related, specialized grammar
- Introduction to reading articles systematically

[*updated 04.12.2020*]

Teaching methods/Media:
- Presentations by the lecturer
- Plenary and group discussions
- Group work phases where students tackle specific tasks
- Multimedia language lab
- Student presentations

[*updated 04.12.2020*]

Recommended or required reading:
- Teaching materials: texts and exercises compiled by the lecturer
- PowerPoint presentations by the lecturer or equivalent visualization forms
- Internet resources

[*updated 04.12.2020*]

German 3

Module name (EN): German 3

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-301

Hours per semester week / Teaching method:
4VU (4 hours per week)

ECTS credits:
4

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 04.12.2020*]

Applicability / Curricular relevance:

DFBGE-019 (P610-0025) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFBEES-301 (P610-0025) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
DFBGE-019 (P610-0025) Electrical Engineering, Bachelor, ASPO 01.10.2015 , semester 3, mandatory course
DFBGM307 Mechanical Engineering, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFBME-301 (P610-0086) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
DFBME-301 (P610-0086) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 3, mandatory course
DFBI-311 (P610-0227) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 3, mandatory course
DFIW-301 (P610-0178) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:

60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
DFIW-401 German 4

[*updated 29.04.2025*]

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
After successfully completing this course, students will have improved their language skills to level B1/B2 (GER).

Listening comprehension/speaking skills
Students will be able to follow a presentation on a topic, give a presentation or initiate a conversation on a relatively broad range of topics. They will have improved their pronunciation.

Reading comprehension
Students will be able to extract relevant information from texts and understand detailed instructions or advice.

Writing
Students will be able to take notes during a conversation/lecture or write a letter that includes non-standard requests.

Grammar/Structures in scientific language
Students will be able to recognize and apply grammatical structures.

[*updated 04.12.2020*]

Module content:
Listening comprehension/speaking skills
- Student presentations on various topics
- Group discussions on various topics
- Speech techniques and strategies
- Speaking in specific situations
- Various audio texts, audiovisual material (general and technical)
- Phonetics

Reading comprehension
- Recognizing and editing different types of text
- Developing and applying reading strategies
- Developing and enlarging vocabulary
Writing
- Memo technique for taking notes with listening comprehension texts / summarizing texts
- Writing formal and personal letters and e-mails
- Free, narrative writing
- Written version of the presentation held in class; scientific writing
- Orthography and punctuation
Grammar/Structures in scientific language
- Practicing and using relevant grammatical structures e.g. adjective declension; conjugation in all tenses, active/passive, subjunctive, causal, temporal, concessive, conditional, modal subordinate clauses, prepositions

[*updated 04.12.2020*]

Teaching methods/Media:
Blackboard, PC presentation; Text and exercise sheets, audio CDs, DVD

[*updated 04.12.2020*]

Recommended or required reading:
Various textbooks (e.g. Mittelpunkt neu), current publications, audio-visual media

[*updated 04.12.2020*]

German 4

Module name (EN): German 4

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-401

Hours per semester week / Teaching method:
4VU (4 hours per week)

ECTS credits:
4

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 04.12.2020*]

Applicability / Curricular relevance:

DFBGE-029 (P610-0031) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFBEES-401 (P610-0031) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
DFBGE-029 (P610-0031) Electrical Engineering, Bachelor, ASPO 01.10.2015 , semester 4, mandatory course
DFBGM407 Mechanical Engineering, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFBME-401 (P610-0318) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
DFBME-401 (P610-0318) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 4, mandatory course
DFBI-411 (P610-0553) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , semester 4, mandatory course
DFIW-401 (P610-0185) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
DFIW-301 German 3

[*updated 29.04.2025*]

Recommended as prerequisite for:

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
Language skills at level B1+/B2 (GER)

Listening comprehension/speaking skills
Students will be able to follow a presentation on a topic, give a presentation or initiate a conversation on a relatively broad range of topics. They will have improved their pronunciation.

Reading comprehension
Students will be able to extract relevant information from texts and understand detailed instructions or advice.

Writing
Students will be able to take notes during a conversation/lecture or write a letter that includes non-standard requests.

Grammar/Structures in scientific language
Students will be able to recognize and apply grammatical structures.

[*updated 04.12.2020*]

Module content:
Listening comprehension/speaking skills
- Student presentations on various topics
- Group discussions on various topics
- Speech techniques and strategies
- Speaking in specific situations
- Various listening comprehension texts, audiovisual material (general and technical)
- Phonetics

Reading comprehension
- Recognizing and editing different types of text
- Developing and applying reading strategies
- Developing and enlarging vocabulary
Writing
- Memo technique for taking notes with listening comprehension texts / summarizing texts
- Writing formal and personal letters and e-mails
- Free, narrative writing
- Scientific writing/ written version of the presentation held in class
- Orthography and punctuation
Grammar/Structures in scientific language
- Practicing and using relevant grammatical structures e.g. adjective declension; conjugation in all tenses, active/passive, subjunctive, causal, temporal, concessive, conditional, modal subordinate clauses, prepositions

[*updated 04.12.2020*]

Teaching methods/Media:
Blackboard, PC presentation; Text and exercise sheets, audio CDs, DVD

[*updated 04.12.2020*]

Recommended or required reading:
Various textbooks (e.g. Mittelpunkt neu B2), current publications, audio-visual media

[*updated 04.12.2020*]

Information Retrieval

Module name (EN): Information Retrieval

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-IRET

Hours per semester week / Teaching method:
2V+2PA (4 hours per week)

ECTS credits:
5

Semester: 3

Mandatory course: yes

Language of instruction:
English

Assessment:
Written exam, duration 90 min./project work

[*updated 13.10.2024*]

Applicability / Curricular relevance:

DFIW-IRET (P610-0540) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course, informatics specific
KI584 (P610-0253) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2014 , semester 5, optional course, informatics specific
KIB-IRET Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 5, optional course, technical
KIB-IRET Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 5, optional course, technical
PIBWI29 Applied Informatics, Bachelor, ASPO 01.10.2011 , semester 5, optional course, informatics specific
PIB-IRET (P221-0080) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 5, optional course, informatics specific

Suitable for exchange students (learning agreement)

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Klaus Berberich

Lecturer: Prof. Dr. Klaus Berberich

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this course, students will have learned basic information retrieval methods. This
includes retrieval models (e.g., Vector Space Model and Binary Independence Model), link analysis (e.g., PageRank), and effectiveness measures (e.g., Precision/Recall
and MAP). They will be able to apply/implement the above methods in practice. In addition, students will be aware of easily accessible information
retrieval systems (e.g., Apache Lucene/Solr).

[*updated 13.10.2024*]

Module content:
Information Retrieval is pervasive and its applications range from finding contacts or e-mails on your smartphone to web-search engines that index billions of web pages. This course covers the most important information retrieval methods. We will look into how these methods are defined formally, including the mathematics behind them, but also see how they can be implemented efficiently in practice. As part of the project work, we will implement a small search engine from scratch.

1. Introduction
- History
- Applications
- Course overview

2. Natural language
- Documents and terms
- Stopwords and stemming/lemmatization
- Synonyms, polysemes, compounds

3. Retrieval models
- Boolean retrieval
- Vector space model with TF.IDF term weighting
- Language models

4. Indexing methods
- Inverted index
- Compression (d-Gaps, variable-byte encoding)
- Index pruning

5. Query processing
- Holistic methods (DAAT, TAAT)
- Top-k methods (NRA, WAND)

6. Evaluation
- Cranfield Paradigm
- Benchmark initiatives (TREC, CLEF, NTCIR)
- Traditional effectiveness measures (precision, recall, MAP)
- Non-traditional effectiveness measures (nDCG, ERR)

7. Web retrieval
- Crawling
- Near-duplicate detection

- Link analysis (PageRank, HITS)
- Web spam

8. Information retrieval systems
- Indri
- Terrier
- Anserini
- Apache Lucene/Solr
- ElasticSearch

[*updated 13.10.2024*]

Recommended or required reading:
Stefan Büttcher, Charles L. A. Clarke, Gordon V. Cormack: Information Retrieval: Implementing and Evaluating Search Engines, MIT Press, 2010.

Reginald Ferber: Information Retrieval: Suchmodelle und Data-Mining Verfahren für Textsammlungen und das Web, dpunkt, 2003.
(available online at: http://information-retrieval.de/irb/ir.html)

W. Bruce Croft, T. Strohman, D. Metzler: Search Engines Information Retrieval in Practice: Information Retrieval in Practice, Pearson, 2009
(Available online at: https://ciir.cs.umass.edu/irbook/)

Christopher D. Manning, Prabhakar Ragahavan, and Hinrich Schütze: Introduction to Information Retrieval, Cambridge University Press, 2008.
(Available online at: http://nlp.stanford.edu/IR-book/)

[*updated 13.10.2024*]

Intercultural Management 3

Module name (EN): Intercultural Management 3

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-304

Hours per semester week / Teaching method:
2VU (2 hours per week)

ECTS credits:
2

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam (50%) and presentation (50%)

[*updated 29.04.2024*]

Applicability / Curricular relevance:

DFIW-304 (P610-0181) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
DFIW-404 Intercultural Management 4

[*updated 29.04.2025*]

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
After successfully completing this module, students will be able to:
define and explain concepts and terms such as culture, stereotypes and perception of others
describe cultural differences in working life with a focus on the Franco-German context
explain and critically reflect on various models of cultural comparison
explain typical critical incidents from the Franco-German working environment with regard to intercultural differences and propose solutions
work out individual cultural differences and peculiarities for themselves using case studies

[*updated 29.04.2024*]

Module content:
apply different cultural models and definitions
recognize different levels of communication and their associated special features in an intercultural context (gestures, facial expressions, proxemics).
Perception of others, stereotypes and prejudices
At least two different models of cultural comparison in contrast (e.g. Hofstede, Lewis, Thomas,

GLOBE)

Practical case studies (texts, videos) from the working world with a focus on Germany-France
Introduction to intercultural competence
Reflections/exercises on own cultural imprint

[*updated 29.04.2024*]

Teaching methods/Media:

Lecturer presentations
(Interactive) exercises and case studies
Group work
Digital content via moodle

[*updated 29.04.2024*]

Recommended or required reading:
General literature recommendations for this module:

Barmeyer, Christoph: Taschenlexikon Interkulturalität. Vandenhoeck & Ruprecht, Göttingen, neueste Auflage.
Breuer, Jochen Peter/de Bartha, Pierre: Deutsch-Französische Geschäftsbeziehungen erfolgreich managen. Spielregeln für die Zusammenarbeit auf Führungs- und Fachebene. Deutscher Wirtschaftsdienst, Köln, neueste Auflage.
Meyer, Erin: The Culture Map. Decoding how people think, lead, and get things done across cultures. Public Affairs, New York, neueste Auflage.
Schroll-Machl, Sylvia (2003): Doing Business with Germans. Their perception, our perception. Göttingen: Vandenhoeck & Ruprecht.
Untereiner, Gilles : Le Marché Allemand: Bien connaître les Allemands pour mieux travailler avec eux. Maxima, Paris, neueste Auflage.

Literature and learning materials will be provided during the course.

[*updated 29.04.2024*]

Intercultural Management 4

Module name (EN): Intercultural Management 4

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-404

Hours per semester week / Teaching method:
2VU (2 hours per week)

ECTS credits:
2

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam (50%) and presentation (50%)

[*updated 29.04.2024*]

Applicability / Curricular relevance:

DFIW-404 (P610-0188, P620-0006) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course

Workload:
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
DFIW-304 Intercultural Management 3

[*updated 29.04.2025*]

Recommended as prerequisite for:

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 29.04.2025*]

Learning outcomes:
After successfully completing this module, students will be able to:
- explain intercultural competence models and apply and transfer them to various professional activities and environments
- explain critical incidents from multicultural everyday and professional situations with regard to intercultural differences and propose solutions
- use case studies from different contexts to work out individual cultural differences and peculiarities for themselves
- explain strategies for building and working in multicultural teams and apply them to case studies
- put leadership, team and management styles in an (inter)cultural context
- critically question their own cultural imprint with regard to communication and conflict resolution in exercises/simulations

[*updated 29.04.2024*]

Module content:

Case studies from professional practice
Team building and work cultures in multicultural teams and projects
Intercultural competence models for different professional fields
Leadership and management styles
Culture shock, international assignments, global assignments
International contrast examples (not limited to Germany and France)
Multi-perspectivity and synergy potential in a multicultural working environment

[*updated 29.04.2024*]

Teaching methods/Media:

Lecturer presentations
(Interactive) exercises and case studies
Group work
Digital content via moodle

[*updated 29.04.2024*]

Recommended or required reading:
General literature recommendations for this module:

Barmeyer, Christoph: Konstruktives interkulturelles Management. Vandenhoeck & Ruprecht, Göttingen, über utb, neueste Auflage.
Heringer, Hans-Jürgen: Interkulturelle Kommunikation. Grundlagen und Konzepte. utb, neueste Auflage.
Meyer, Erin: The Culture Map. Decoding how people think, lead, and get things done across cultures. Public Affairs, New York, neueste Auflage.
Schroll-Machl, Sylvia: Doing Business with Germans. Their perception, our perception. Göttingen: Vandenhoeck & Ruprecht, neueste Auflage.

Literature and learning materials will be provided during the course.

[*updated 29.04.2024*]

Operating Systems

Module name (EN): Operating Systems

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-BS

Hours per semester week / Teaching method:
2V+2P (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 19.02.2018*]

Applicability / Curricular relevance:

DFIW-BS (P610-0191) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
KIB-BS (P222-0007) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 4, mandatory course
KIB-BS (P222-0007) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 3, mandatory course
PIB-BS (P221-0013) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 4, mandatory course
PRI-BS (P222-0007) Production Informatics, Bachelor, SO 01.10.2023 , semester 3, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Steffen Knapp

Lecturer: Prof. Dr. Steffen Knapp

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this module, students will be familiar with the typical structure and principles of operating systems and alternatives in development. In addition, they will also understand the maintenance strategies of the respective resources and the mechanisms of scheduling and process synchronization. They will be able to apply the contexts they have learned to other operating systems and environments.

[*updated 01.07.2021*]

Module content:
Introduction, Operating system concepts
Memory management, paging
Process management, competing processes
Scheduling
Synchronization
Virtualization

[*updated 01.07.2021*]

Teaching methods/Media:
Combination of lecture and practical course/tutorial/exercises
Lecture slides, exercises, sample solutions

[*updated 01.07.2021*]

Recommended or required reading:
J. Nehmer, P. Sturm: Systemsoftware-Grundlagen moderner Betriebssysteme, Punkt 2001
A. Tanenbaum, H. Bos: Moderne Betriebssysteme, Pearson Studium 2016
W. Stallings: Operating Systems, Prentice Hall, 2014
A. Silberschatz et al.: Operating System Concepts, Wiley, 2008

[*updated 01.07.2021*]

Programming 1

Module name (EN): Programming 1

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-PRG1

Hours per semester week / Teaching method:
4V+2P (6 hours per week)

ECTS credits:
8

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Exam

[*updated 30.10.2023*]

Applicability / Curricular relevance:

DFIW-PRG1 (P610-0182) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, mandatory course
PIB-PR1 (P221-0031) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 1, mandatory course

Workload:

90 class hours (= 67.5 clock hours) over a 15-week period.
The total student study time is 240 hours (equivalent to 8 ECTS credits).
There are therefore 172.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
DFIW-PRG2 Programming 2

[*updated 26.07.2024*]

Module coordinator:
Prof. Dr.-Ing. Martin Burger

Lecturer: Prof. Dr.-Ing. Martin Burger

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this module students will: be able to write Java code that uses different data types, expressions and control structures to perform simple calculations.
- Students will be able to create classes in Java, instantiate objects and apply basic inheritance concepts to model relationships between classes.
- They will be able to use the functionality of selected Java API classes such as String, ArrayList and Exception classes in their own programs.
- They will be able to assess the quality of Java code and suggest improvements to increase readability and efficiency.
- They will be able to develop their own algorithms and solutions for complex programming tasks.
- Students will work on a software project where they apply object-oriented principles to create a fully functional application.
- Students will have developed competence in lifelong learning by applying learning strategies and methods for self-organized knowledge acquisition and reflecting on their effectiveness.
- Students will have developed their ability to collaborate by organizing themselves into teams of two to work together on a software project.

[*updated 21.12.2023*]

Module content:
The focus of the module is on object-oriented programming and its meaningful application. The following skills are taught using the Java programming language and strengthened through practical exercises:

- Classes and objects
- Elementary data types and references
- Methods and instance variables
- Writing a program
- Getting to know the Java API and other APIs
- Inheritance and polymorphism
- Interfaces and abstract classes
- Constructors and Garbage Collection
- Figures and statics
- Exception handling
- Serialization and file I/O

In addition, the following topics belong to the interdisciplinary skills covered in this module:

- Learning strategies such as active listening and note-taking
- Reflecting on learning strategies
- Principles of team work
- Team dynamics
- Agreements on productive collaboration
- Reflecting on collaborations

[*updated 21.12.2023*]

Teaching methods/Media:
Transparencies, projector, board, lecture-specific website

[*updated 24.02.2018*]

Recommended or required reading:
Bloch, J. (2018). Effective Java: Best Practices für die Java-Plattform. Deutschland: dpunkt.verlag.

Inden, M. (2020). Java Challenge: Fit für das Job-Interview und die Praxis - mit mehr als 100 Aufgaben und Musterlösungen. Deutschland: dpunkt.verlag.

Sierra, K., Bates, B., Gee, T. (2023). Java von Kopf bis Fuß: Eine abwechslungsreiche Entdeckungsreise durch die objektorientierte Programmierung. Deutschland: O Reilly.

Thomas, D., Hunt, A. (2021). Der Pragmatische Programmierer: Ihr Weg zur Meisterschaft. Deutschland: Carl Hanser Verlag GmbH & Company KG.

Ullenboom, C. (2022). Java ist auch eine Insel: Einführung, Ausbildung, Praxis. Deutschland: Rheinwerk.

[*updated 30.10.2023*]

Programming 2

Module name (EN): Programming 2

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-PRG2

Hours per semester week / Teaching method:
4V+2P (6 hours per week)

ECTS credits:
8

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 24.02.2018*]

Applicability / Curricular relevance:

DFIW-PRG2 (P610-0190) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
PIB-PR2 (P221-0032) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 2, mandatory course

Workload:
90 class hours (= 67.5 clock hours) over a 15-week period.
The total student study time is 240 hours (equivalent to 8 ECTS credits).
There are therefore 172.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
DFIW-PRG1 Programming 1

[*updated 26.07.2024*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Markus Esch

Lecturer: Prof. Dr. Markus Esch

[*updated 09.08.2020*]

Learning outcomes:
This module is based on the "Programming 1" module and will help students deepen their knowledge and understanding of object-oriented programming.

After successfully completing this module, students will be able to explain and apply advanced concepts of object-oriented programming in Java. They will be able to design and implement object-oriented solutions.

Based on the theoretical knowledge of data structures from the Informatics 1 module, students will be able to implement and apply different data structures. In addition, they will also be able to select the data structure that is most suitable for an application scenario.

In addition to deepening their knowledge of object-oriented programming, students will learn the basic concepts of the programming language C. They will be able to name the concepts and characteristics of imperative programming in C. Students will be able to explain the differences, as well as the advantages and disadvantages of object-oriented and type-safe languages such as C and will be able to apply this knowledge to the implementation of C programs.

Within the framework of practical exercises, students will learn to work together in small groups.

[*updated 24.02.2018*]

Module content:
- Advanced object-oriented programming concepts in Java

  o Recursion
  o Generics
  o Annotations
  o Reflection
  o Lambda expressions
  o Implementation aspects of trees, graphs and lists
  o Java Collections Framework
  o Streams
- C programming
  o The structure of a C program
  o Expressions, operators, control structures and functions
  o Basic and structured data types
  o Pointers and pointer arithmetic
  o Storage management
  o Preprocessors, compilers, linkers, debuggers, make
  o Using libraries
  o Complex data structures in C

[*updated 24.02.2018*]

Teaching methods/Media:
Lecture slides, annotated lecture slides as a script, program examples, project work

[*updated 24.02.2018*]

Recommended or required reading:
G. KRÜGER, H. HANSEN: Java Programmierung _ Das Handbuch zu Java 8, O´Reilly, 2014

R-G. URMA, M. FUSCO, A.MYCROFT: Java 8 in Action: Lambdas, Streams, and Functional-Style Programming, Manning Pubn, 2014

A. SOLYMOSI, U. GRUDE: Grundkurs Algorithmen und Datenstrukturen in JAVA: Eine Einführung in die praktische Informatik, Springer, 2014

B.W. KERNIGHAN, D. RITCHIE: The C Programming Language, Prentice Hall, 2nd Edition, 1988

D. Logofatu: Einführung in C: Praktisches Lern- und Arbeitsbuch für Programmieranfänger, Springer, 2. Auflage, 2016

[*updated 24.02.2018*]

Programming Tools

Module name (EN): Programming Tools

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-PWZ

Hours per semester week / Teaching method:
2V+2P (4 hours per week)

ECTS credits:

5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Project

[*updated 24.02.2018*]

Applicability / Curricular relevance:

DFBI-443 (P610-0254) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2018 , optional course, informatics specific
DFIW-PWZ (P610-0193) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course, informatics specific
KI569 Computer Science and Communication Systems, Bachelor, ASPO 01.10.2014 , semester 6, optional course, informatics specific
KIB-PRGW (P221-0124) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 6, optional course, technical
KIB-PRGW (P221-0124) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 6, optional course, technical
PIBWI13 Applied Informatics, Bachelor, ASPO 01.10.2011 , semester 6, optional course, informatics specific
PIB-PRGW (P221-0124) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 4, optional course, informatics specific

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Reinhard Brocks

Lecturer: Prof. Dr. Reinhard Brocks

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this module, students will be able to choose the suitable tools for each phase of the implementation process. They will be able to define the toolchain for a software project, configure its development environment, and implement an automatic build process. They will be able to explain the basic functions of different programming tools and use them for a specific programming language Students will be

capable of describing the structure of program libraries and frameworks and will be able to create them themselves or integrate them into their own projects. They will be able to use integrated development environments for software development.

[*updated 24.02.2018*]

Module content:
- Functions within source code editors
- Command line and scripts
- Software documentation tools
- Build tools
- Integrated development environments and their configuration
- Debuggers
- Version management
- Test frameworks
- Static source code analysis tools
- Profilers
- Issue tracking systems
- Cross-compiling
- Bug tracking systems
- Package managers
- Virtual machines

[*updated 24.02.2018*]

Teaching methods/Media:
Examples, project work, practical course with exercises, group work

[*updated 24.02.2018*]

Recommended or required reading:
Original documentation for the various software development tools

Brocks, R.: Open Educational Resources / OER zu Programmierwerkezuge, https://www.htwsaar.de/ingwi/fakultaet/personen/profile/Reinhard%20Brocks/open-educational-resources , 2019
Zeller, A., Krinke, J.: Open-Source-Programmierwerkzeuge, dpunkt, 2003
Preißel, René; Stachmann, Bjørn: Git : dezentrale Versionsverwaltung im Team; Grundlagen und Workflows, dpunkt, 2012
Jürgen Wolf; Stefan Kania : Shell-Programmierung : das umfassende Handbuch; Einführung, Praxis, Übungsaufgaben, Kommandoreferenz; Bonn : Galileo Press, 2013
Helmut Herold : UNIX und seine Werkzeuge, Make und nmake : Software-Management unter UNIX und MS-DOS, Addison-Wesley, 1994
Bernd Matzke: Ant : eine praktische Einführung in das Java Build-Tool, Heidelberg : dpunkt-Verl., 2005
Martin Spille: Maven 3 : Konfigurationsmanagement mit Java, mitp, 2011
Michael Tamm : JUnit-Profiwissen : effizientes Arbeiten mit der Standardbibliothek für automatisierte Tests in Java; Heidelberg : dpunkt-Verl., 2013
Durelli, Vinicius H. S. ; Araujo, Rodrigo Fraxino ; Rafael Medeiros Teixeira: Getting Started with Eclipse Juno; Birmingham : Packt Publishing, 2013

[*updated 30.07.2021*]

Security Engineering

Module name (EN): Security Engineering

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-SE

Hours per semester week / Teaching method:
2V+2P (4 hours per week)

ECTS credits:
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 26.02.2018*]

Applicability / Curricular relevance:

DFIW-SE (P610-0194) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, mandatory course
KIB-SE (P222-0039) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 4, mandatory course
KIB-SE (P222-0039) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 4, mandatory course
PIB-SE (P222-0039) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 4, mandatory course
PRI-SE (P222-0039) Production Informatics, Bachelor, SO 01.10.2023 , semester 4, mandatory course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Damian Weber

Lecturer: Prof. Dr. Damian Weber

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this module, students will be familiar with the critical parts, procedures and audit-relevant data of an operating system.
An open source UNIX system will be used in order to be able to comprehensively analyze processes, security gaps and system calls in detail. The knowledge of these components and their weak points will enable the students to pursue a security-by-design approach for new application systems or the configuration of operating systems, which prevents vulnerabilities from the outset.
This includes basic knowledge of current cryptography methods. Students will learn to integrate the social necessity of data protection and privacy protection in communication processes into their future concepts.

[*updated 26.02.2018*]

Module content:
1. Security terms, threat model, examples
2. Identities, authentication, authorization
3. Encryption (symmetric, asymmetric)
4. Cryptographic hash functions, message authentication codes
5. UNIX from a security perspective
6. Auditing, system status, system statistics
7. Network security, perimeter security
8. Penetration tests

[*updated 26.02.2018*]

Recommended or required reading:
D. Kim, M. G. Solomon, Fundamentals Of Information Systems Security, 2016
G. Weidman, Penetration Testing: A Hands-On Introduction to Hacking, 2014
https://www.sans.org/
http://www.securityfocus.com/vulnerabilities

[*updated 26.02.2018*]

Work Experience Phase

Module name (EN): Work Experience Phase

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-PRA

Hours per semester week / Teaching method:
-

ECTS credits:
15

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Study report (10-15 Seiten), presentation (ca. 15 min.)

[*updated 17.04.2025*]

Applicability / Curricular relevance:

DFIW-PRA (S610-0210) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 6, mandatory course
KIB-PRA (S222-0026) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2021 , semester 6, mandatory course
KIB-PRA (S222-0026) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course
PIB-PRA (S221-0173) Applied Informatics, Bachelor, ASPO 01.10.2022 , semester 6, mandatory course
PRI-PRA (S223-0002) Production Informatics, Bachelor, SO 01.10.2023 , semester 6, mandatory course

Workload:
The total student study time for this course is 450 hours.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Studienleitung

Lecturer: Studienleitung

[*updated 09.08.2020*]

Learning outcomes:
After successfully completing this module, students will:
be able to apply the skills and knowledge acquired during their studies to project tasks in a company.
have learned to familiarize themselves with a new working environment.
have solved concrete, thematically focused problems in a company.
have gained actual practical insight into the role of computer scientists in a company.
be familiar with the organizational structure of a company.

[*updated 17.04.2025*]

Module content:
Together, the student, their university supervisor and the company where the internship is carried out will determine the topics to be worked on by the student during his or her internship. The work done during the internship should prepare students for the bachelor thesis to be written afterwards

Each student will write a report of approx. 8-10 DIN A4 pages about the work done during their internship and describe their practical experience.

In addition, they are required to give a short lecture on the contents of his practical phase.

[*updated 26.02.2018*]

Recommended or required reading:
Depends on the respective subject areas dealt with in practice.

[*updated 26.02.2018*]

Computer Science and Web Engineering Bachelor - optional courses

Spanish 3

Module name (EN): Spanish 3

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-306

Hours per semester week / Teaching method:
4VU (4 hours per week)

ECTS credits:
4

Semester: 3

Mandatory course: no

Language of instruction:
Spanish

Assessment:
Written exam (50%) + presentation (25%) + tests (25%)

[*updated 08.01.2024*]

Applicability / Curricular relevance:

DFBEES-313 (P610-0624) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , optional course
DFBME-306 (P610-0334, P610-0631) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , mandatory course
DFBME-306 (P610-0334, P610-0631) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 3, optional course
DFITM-315 (P620-0634) International Tourism Management, Bachelor, ASPO 01.10.2020 , semester 3, optional course
DFIW-306 (P610-0626) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 3, optional course

DFILM-308 (P620-0632) International Logistics Management, Bachelor, ASPO 01.10.2022 , semester 3, optional course
DFIM-315 (P620-0630) German-French and International Management, Bachelor, ASPO 01.10.2019 , semester 3, optional course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
DFIW-406 Spanish 4

[*updated 21.06.2024*]

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 21.06.2024*]

Learning outcomes:
The initial level is A2.

After successfully completing this module, students will:
be able to understand simple and clear standard language in written and spoken form
be able to talk about familiar topics from their studies, work and leisure time
be able to express themselves simply and coherently on familiar topics and personal areas of interest
be able to outline the goals of their studies and describe their professional and technical plans for the future
be able to talk about current affairs

[*updated 08.01.2024*]

Module content:
Repetition and consolidation of past tenses and their use (perfecto/indefinido)
Introduction of future tenses (futuro proximo + futuro simple)
Introduction of the subjunctive
Speaking and writing about professional and private future plans, wishes and experiences
Speaking and writing about simple news, political and social issues
Describing simple graphics and diagrams
Culture, geography and history of Spanish-speaking countries

[*updated 08.01.2024*]

Teaching methods/Media:
The learning content is developed in a communicative and action-oriented manner with targeted listening, reading and speaking exercises in individual, partner and group work. A subject-related presentation on the course content is obligatory.
Short written or oral progress tests are a component of the course.

[*updated 08.01.2024*]

Recommended or required reading:
Multimedia-supported teaching and learning material to intensify teaching will be provided in the course and via Moodle.

[*updated 08.01.2024*]

Spanish 4

Module name (EN): Spanish 4

Degree programme: Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019

Module code: DFIW-406

Hours per semester week / Teaching method:
4VU (4 hours per week)

ECTS credits:
4

Semester: 4

Mandatory course: no

Language of instruction:
Spanish

Assessment:
Written exam (50%) and tests over the course of the semester (50%)
Written exam 90 min.

[*updated 30.04.2025*]

Applicability / Curricular relevance:

DFBEES-414 (P610-0625) Electrical Engineering - Renewable Energy and System Technology, Bachelor, ASPO 01.10.2019 , optional course
DFBME-408 (P610-0343, P610-0628) Mechanical Engineering, Bachelor, ASPO 01.10.2019 , mandatory course
DFBME-408 (P610-0343, P610-0628) Mechanical Engineering, Bachelor, ASPO 01.10.2024 , semester 4, optional course
DFITM-409 (P620-0635) International Tourism Management, Bachelor, ASPO 01.10.2020 , semester 4, optional course

DFIW-406 (P610-0627) Computer Science and Web Engineering, Bachelor, ASPO 01.10.2019 , semester 4, optional course
DFILM-418 (P620-0633) International Logistics Management, Bachelor, ASPO 01.10.2022 , semester 4, optional course
DFIM-416 (P620-0631) German-French and International Management, Bachelor, ASPO 01.10.2019 , semester 4, optional course

Workload:
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
DFIW-306 Spanish 3

[*updated 21.06.2024*]

Recommended as prerequisite for:

Module coordinator:
Dr. Julia Frisch

Lecturer:
Dozierende des Studiengangs

[*updated 21.06.2024*]

Learning outcomes:
The initial level is A2+/B1, the targeted level B1+.

After successfully completing this module, students will:
be able to reproduce content from films, articles and interviews
be able to understand and make suggestions for organizing their leisure time and work and will be able to reject and accept them
be able to create their own graphics and tables
be able to extract arguments and justifications from discussions (audio/video/simulations) and use them in pro/con arguments to express their own position
be able to write their own short fictional texts

[*updated 08.01.2024*]

Module content:
The content builds on that of Spanish 3.
Consolidating the subjunctive + using subjunctive tenses
Indirect speech
Conditional sentences with si, relative pronouns
Reciprocal verbs
Formulating descriptions, content renditions, interpretations
The ability to extract meaning from simple fictional texts, newspaper articles and factual texts
Regional studies: The history of Spain and the Spanish-speaking world

[*updated 08.01.2024*]

Teaching methods/Media:

The learning content is developed in a communicative and action-oriented manner with targeted listening, reading and speaking exercises in individual, partner and group work. A subject-related presentation on the course content is obligatory.

Short written or oral progress tests are a component of the course.

[*updated 08.01.2024*]

Recommended or required reading:

Multimedia-supported teaching and learning material to intensify teaching will be provided in the course and via Moodle.

[*updated 08.01.2024*]