Course Handbook Production Informatics Bachelor

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Qualifikation Goals of Study Programme

Production Informatics Bachelor - mandatory courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Bachelor Colloquium	PRI-BK		6	-	3	Studienleitung
Bachelor Thesis	PRI-BT		6	-	12	Studienleitung
Business Communication and Intercultural Competence	PRI-BEM		1	2SU	2	Prof. Dr. Christine Sick
Computer Architecture	PRI-RAR		2	3V+1P	5	Prof. Dr. Steffen Knapp
Computer Networks	PRI-RN		3	2V+2P	5	Prof. Dr. Steffen Knapp
Databases	PRI-DB		3	3V+1P	5	Prof. Dr. Klaus Berberich
Informatics 1	PRI-INF1		1	2V+2U	5	Prof. Dr. Damian Weber
Informatics 2	PRI-INF2		2	2V+2U	5	Prof. Dr. Damian Weber
Manufacturing Process Technology (with Lab Course)	PRI-TFL		2	4V+1LU	5	Prof. Dr. Jürgen Griebsch

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator
Mathematics 1	PRI-MAT1		1	4V+2U	7	Prof. Dr. Peter Birkner
Mathematics 2	PRI-MAT2		2	3V+1U	5	Prof. Dr. Peter Birkner
Mathematics 3	PRI-MAT3		3	2V+1U	3	Prof. Dr. Peter Birkner
Operating Systems	PRI-BS		3	2V+2P	5	Prof. Dr. Steffen Knapp
Production and Quality Management	PRI-MST		5	2V+1P	3	Prof. Dr. Jürgen Griebsch
Professional Presentations	PRI-ENG3		3	2SU	2	Prof. Dr. Christine Sick
Programming 1	PRI-PRG1		1	4V+2P	8	Prof. Dr. Martina Lehser
Project Management	PRI-PM		2	2V	3	Prof. Dr. Steffen Knapp
Security Engineering	PRI-SE		4	2V+2P	5	Prof. Dr. Damian Weber
Technical Reading and Writing	PRI-TEM		2	2SU	2	Prof. Dr. Christine Sick
Work Experience Phase	PRI-PRA		6	-	15	Studienleitung

(20 modules)

Production Informatics Bachelor - optional courses (overview)

Module name (EN)	Code	SAP-P	Semester	Hours per semester week / Teaching method	ECTS	Module coordinator

(0 modules)

Production Informatics Bachelor - mandatory courses

Bachelor Colloquium

Module name (EN): Name of module in study programme. It should be precise and clear. **Bachelor Colloquium**
Degree programme: Study Programme with validity of corresponding study regulations containing this module. Production Informatics, Bachelor, ASPO 01.10.2021
Module code: PRI-BK
Hours per semester week / Teaching method: The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week. -
ECTS credits: European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours. 3
Semester: 6
Mandatory course: yes
Language of instruction: German
Assessment: Oral presentation [*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

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 01.10.2017 , semester 6, mandatory course
PIB-BK (S221-0010) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 6, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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):
Name of module in study programme. It should be precise and clear.
Bachelor Thesis

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-BT

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
-

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
12

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Written composition

[*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

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 01.10.2017 , semester 6, mandatory course
PIB-BT (T221-0008) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 6, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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*]

Business Communication and Intercultural Competence

Module name (EN):
Name of module in study programme. It should be precise and clear.
Business Communication and Intercultural Competence

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-BEM

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2SU (2 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
2

Semester: 1

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-ENG1 (P222-0008) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course
PIB-EN1 (P221-0017) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course

Suitable for exchange students (learning agreement)

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture,

exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 07.08.2019*]

Learning outcomes:
Note:
The modules "Business Communication and Intercultural Competence", "Technical Reading and Writing", as well as "_Professional Presentations" should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

About the "Business Communication and Intercultural Competence" module:
After successfully completing this module, students will have received insight into the differences in international working environments, especially in English-language working environments, and can describe professional tasks. They will be able to recognize potential difficulties and conflicts in intercultural communication situations and can draw conclusions for their own behaviour in international contexts. In this context, they will be able to use adequate means of speech and behaviour for specific oral communication situations. In addition, they will be sensitized to different language registers and can apply them adequately in given written communication situations with international business partners.

[*updated 12.04.2018*]

Module content:
- Greetings, introductions and small talk
- Describing job-related tasks
- Making phone calls in a professional context
- Correspondence with business partners

In addition, we will work on:
- Vocabulary
- Repeating relevant grammatical structures
- Raising awareness for functional language use

- Intercultural aspects

[*updated 12.04.2018*]

Teaching methods/Media:
Teaching and learning materials (print, audio, video), multimedia teaching and learning software for specific target groups

[*updated 19.02.2018*]

Recommended or required reading:
Students will receive a list of recommended teaching and learning materials.
The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Susanne Ley, Christine Sick: prep course English in m&eLanguageLearningPortal@CAS (e- and mobile learning offer to support students in English language learning at the Alt-Saarbrücken campus of the htw saar, Niveau A1-B1)

Christine Sick (2015): TechnoPlus Englisch VocabApp (Mobile-Learning-Angebot insbesondere zum Grundwortschatz, alle Niveaustufen), EUROKEY.

Christine Sick, unter Mitarbeit von Miriam Lange (2011): TechnoPlus Englisch 2.0 (Multimediales Sprachlernprogramm für Technisches und Business Englisch, Niveau B1-B2+), EUROKEY.

[*updated 19.02.2018*]

Computer Architecture

Module name (EN):
Name of module in study programme. It should be precise and clear.
Computer Architecture

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-RAR

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
3V+1P (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

PIB-RAR (P221-0037) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 01.12.2022*]

Learning outcomes:
After successfully completing this module, students will understand digital circuits (switching networks,

switching devices) and will be able to analyze and design them. This practical course will help students acquire the necessary experience to develop and build important applications, especially in the field of computer technology.

Students will learn how digital computers are structured, organized and how they operate. They will be able to bring the architectural elements of a computer together, at register level, to create an example architecture. By understanding command processing, addressing techniques and concepts such as pipeline and cache, the participants will acquire the necessary knowledge to understand modern computer architectures.

[*updated 26.02.2018*]

Module content:
Part I:
1. Introduction
2. Combinational circuits
 2.1 Basics
 2.2 Normal forms
 2.3 Minimization of switching functions
 2.4 Examples
3. Sequential circuits
 3.1 Flip flops
 3.2 Registers, shift registers
 3.3 Counters
 3.4 Examples

Part II:
1. Representing numbers in the computer
2. Von Neumann architecture
3. Memory components
4. Sequential control
5. Microprogramming
6. Instruction set architecture
7. Interrupt handling
8. RISC processors
9. Pipelining
10. Cache

[*updated 26.02.2018*]

Recommended or required reading:
Part I:
Borgmeyer: Grundlagen der Digitaltechnik, Hanser-Verlag, 2001
Borucki: Grundlagen der Digitaltechnik, Teubner-Verlag, 2000
Beuth: Digitaltechnik, Vogel Verlag, 2003
Urbanski: Digitaltechnik, Springer Verlag, 2004

Part II:

W. Schiffmann, R. Schmitz: Technische Informatik 2, Springer-Verlag, Berlin, 1999
K. Wüst, Mikroprozessortechnik, Vieweg-Verlag, Braunschweig, 2003
H. Malz, Rechnerarchitektur, Vieweg-Verlag, Braunschweig, 2004
J. L. Hennessy, D. A. Patterson: Rechnerarchitektur Analyse, Entwurf, Implementierung und Bewertung, Vieweg-Verlag, Braunschweig, 2004
P. Herrmann : Rechnerarchitektur _ Aufbau Organisation und Implementierung, Vieweg-Verlag, Braunschweig, 2000

[*updated 26.02.2018*]

Computer Networks

Module name (EN):
Name of module in study programme. It should be precise and clear.
Computer Networks

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-RN

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+2P (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

BMT2551.RN Biomedical Engineering, Bachelor, ASPO 01.10.2018 , 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 01.10.2017 , semester 3, mandatory course
PIB-RN (P221-0038) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 4, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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):
Name of module in study programme. It should be precise and clear.
Databases

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-DB

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
3V+1P (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:

All study programs (with year of the version of study regulations) containing the course.

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 01.10.2017 , semester 3, mandatory course
PIB-DB (P221-0018) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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 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 19.02.2018*]

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. NoSQL

[*updated 19.02.2018*]

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

[*updated 19.02.2018*]

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, 2013

Wiese Lena: Advanced Data Management, De Gruyter, 2015

[*updated 19.02.2018*]

Informatics 1

Module name (EN):
Name of module in study programme. It should be precise and clear.
Informatics 1

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.

Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-INF1

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+2U (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-INF1 (P222-0016) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

Learning outcomes:
After successfully completing this course, students will be able to use the basic concepts of algorithms and data structures in a targeted manner.
They will understand the representation of data in a computer and can use it in data structures to solve problems. Through the use of a Random Access Machine machine model they will gain become acquainted with the basic operations a computer can perform. They will be able to accurately express problems and analyze simple algorithmic problems to develop solutions. They will be able to asymptotically estimate the effort required for the solution.

The related techniques will be learned and intensified in theoretical training sessions by means of independent work.

[*updated 19.02.2018*]

Module content:
1. Mathematic principles
1.1 Number systems
1.2 Boolean algebra

2. Random Access Machine machine model
2.1 Structure
2.2 Program correctness
2.3 Program runtime

3. Data structures
3.1 Arrays
3.2 Lists
3.3 Heaps
3.4 Hash tables
3.5 Search trees

4. Algorithms
4.1 High-level programming languages
4.2 Recursion
4.3 Sorting

[*updated 19.02.2018*]

Teaching methods/Media:
RAMses, a RAM simulator

[*updated 19.02.2018*]

Recommended or required reading:
Cormen Th., Leiserson Ch., Rivest R., Introduction to Algorithms, Oldenbourg, 2013
Sedgewick R., Wayne K., Algorithmen und Datenstrukturen, Pearson Studium, 2014

[*updated 19.02.2018*]

Informatics 2

Module name (EN):
Name of module in study programme. It should be precise and clear.
Informatics 2

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-INF2

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+2U (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:

All study programs (with year of the version of study regulations) containing the course.

KIB-INF2 (P222-0017) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

Learning outcomes:
After successfully completing this course, students will understand the formulation of different algorithmic problems as a graph problem.

Students will be able to solve graph problems algorithmically. The knowledge about data structures and basic algorithmic techniques acquired in the course "Informatics 1" will be applied to solve these problems. In this way, students will acquire the skills required to analyze more complex algorithms.

Finally, an intuitive introduction to important complexity classes will provide the basis for understanding the algorithmic solvability of problems. The approaches of Greedy algorithms and dynamic programming will be understood as techniques for solving difficult algorithmic problems approximately and efficiently. By analyzing the consumption of resources, students will be able to decide for individual problems whether efficient, exact or heuristic procedures are available for solving them.

[*updated 26.02.2018*]

Module content:
1. Graphs
1.1 Data structures

1.2 Basic algorithms
1.3 Shortest paths
1.4 Connected components

2. Problem solving techniques
2.1 Dynamic programming
2.2 Greedy algorithms
2.3 Analytical techniques of approximate methods

[*updated 19.02.2018*]

Teaching methods/Media:

[*updated 19.02.2018*]

Recommended or required reading:
Cormen Th., Leiserson Ch., Rivest R., Introduction to Algorithms, Oldenbourg, 2013
Sedgewick R., Wayne K., Algorithmen und Datenstrukturen, Pearson Studium, 2014

[*updated 19.02.2018*]

Manufacturing Process Technology (with Lab Course)

Module name (EN):
Name of module in study programme. It should be precise and clear.
Manufacturing Process Technology (with Lab Course)

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-TFL

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
4V+1LU (5 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 120 min. (graded)
Lab experiment (evaluated)

[*updated 05.11.2020*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

MAB_19_A_2.02.TFL (P241-0286, P241-0287) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 2, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 93.75 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:
PRI-CAXG
PRI-CAXP
PRI-MST Production and Quality Management

[*updated 09.12.2022*]

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer: Prof. Dr. Jürgen Griebsch

[*updated 07.08.2019*]

Learning outcomes:
After successfully completing this course, students will be familiar with important manufacturing processes and the machine tools used.
They will be familiar with the characteristics and possible applications of the manufacturing processes according to DIN 8550.
Students will be able to select a process based on technical criteria for a production task and by weighing up the advantages and disadvantages.
They will be able to outline manufacturing chains for simple tasks.
Students will be familiar with the practical application of selected manufacturing processes according to DIN 8550.

[*updated 05.11.2020*]

Module content:
The quality and efficiency of industrial production depends on choosing the right manufacturing process and understanding that process. That is why knowledge about the various technologies is one of a production engineers important tools.
Basic components of manufacturing processes according to DIN 8550 are:
- Primary processing (e.g. casting)
- Forming
- Cutting
- Coating
- Modifying

We will also discuss joining to a limited extent, but it is one of the main focuses of the 5th semester in the lecture "Joining Techniques with Integrated Lab Course".

The content of the course is based on a roughly defined industrial process and will prepare students for the production engineering lab that accompanies the lecture.

The lecture will be combined with smaller practical exercises where students can work on topics, present them briefly and then discussion them.

[*updated 05.11.2020*]

Teaching methods/Media:
- Lecture with exercises and calculations on the blackboard
- Lab - Practical course

[*updated 05.11.2020*]

Recommended or required reading:
Spur, G.; Handbuch Fertigungstechnik in 5 Bänden; Hanser Verlag, 2016

Fritz, A.-H.; Fertigungstechnik; Springer Verlag, 2018; ISBN: 978-3-662-56535-3

Gebhardt, A.; Additive Fertigungsverfahren; Hanser Verlag, 2016; ISBN: 978-3-446-44539-0

Geiger, Walter / Kotte, Willi; "Handbuch Qualität, Grundlagen und Elemente des Qualitätsmanagements: Systeme _ Perspektiven"; ISBN: 978-3-8348-0273-6

Keferstein, Claus P. / Dutschke, Wolfgang; "Fertigungsmesstechnik Praxisorientierte Grundlagen, moderne Messverfahren"; ISBN: 978-3-8351-0150-0

Tschätsch, Heinz; "Praxis der Zerspantechnik - Verfahren, Werkzeuge, Strahlquellen, Systeme, Fertigungsverfahren; ISBN: 978-3-8351-0005-3

Ralf Berning; "Grundlagen der Produktion: Produktionsplanung und Beschaffungsmanagement (Taschenbuch)"; ISBN: 978-3464495131

König, Klocke; "Fertigungsverfahren 1-5: Fertigungsverfahren 1. Drehen, Fräsen, Bohren: Drehen, Frasen, Bohren: Bd 1 (Gebundene Ausgabe)"; ISBN: 978-3540234586

Fritz, Schulze; "Fertigungstechnik (VDI)"; ISBN: 978-3540766957

Westkämper, Engelbert / Warnecke, Hans-Jürgen; "Einführung in die Fertigungstechnik"; ISBN: 978-3-8351-0110-4

Habenicht, Gerd; "Kleben - erfolgreich und fehlerfrei - Handwerk, Praktiker, Ausbildung, Industrie"; ISBN: 978-3-8348-0019-0

Hügel, Helmut / Graf, Thomas; "Laser in der Fertigung (Arbeitstitel)- Strahlquellen, Systeme, Fertigungsverfahren; ISBN: 978-3-8351-0005-3

Ralf Berning; "Grundlagen der Produktion: Produktionsplanung und Beschaffungsmanagement (Taschenbuch)"; ISBN: 978-3464495131

König, Klocke; "Fertigungsverfahren 1-5: Fertigungsverfahren 1. Drehen, Fräsen, Bohren: Drehen, Frasen, Bohren: Bd 1 (Gebundene Ausgabe)"; ISBN: 978-3540234586

[*updated 05.11.2020*]

Mathematics 1

Module name (EN):
Name of module in study programme. It should be precise and clear.
Mathematics 1

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-MAT1

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
4V+2U (6 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
7

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-MAT1 (P221-0001) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course
PIB-MA1 (P221-0001) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
90 class hours (= 67.5 clock hours) over a 15-week period.
The total student study time is 210 hours (equivalent to 7 ECTS credits).
There are therefore 142.5 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Peter Birkner

Lecturer: Prof. Dr. Peter Birkner

[*updated 07.08.2019*]

Learning outcomes:
Students will learn basic mathematical concepts from the areas of predictive logic, sets and figures and be able to use them confidently when formulating mathematical statements.
Students will be able to reproduce basic formulas from the field of combinatorics and use these to develop solutions for combinatoric problems.
They will be capable of explaining the mathematical proof concepts of direct proof, indirect proof and complete induction and thus, come up with new evidence.
They will be able to enumerate the axioms of the algebraic structures group, ring and field and check the corresponding properties for structures with given operations.
Students will learn the terms and statements of group theory and be able to identify them in examples of groups, such as (Z/mZ, +) and ((Z/pZ)\{0}, *).
They will be able to explain vector space axioms and demonstrate them in Euclidean space.
Students will be able to develop solutions in Euclidean space for geometrical problems using vector algebra, the dot product, the vector product and the triple product.
They will be able to explain basic concepts of the theory of n-dimensional vector spaces.
They will have mastered elementary matrix calculation rules and determinant calculation rules and learn how linear images can be represented and handled using matrices.
Students will be able to demonstrate how to solve a linear system and learn to master the Gauss algorithm as a method for solving linear systems.
Finally, students will gain an insight into the manifold applications of mathematics in computer science (the development of programming languages, program verification, digital technology, computing accuracy on computers, cryptography, computer graphics_).

[*updated 19.02.2018*]

Module content:
Basic mathematical terms
- Propositional logic, first-order logic, sets, especially uncountably infinite sets
- Relations, especially equivalence relations, partitions, functions

Algebraic structures
- Semigroups, monoids
- Groups, subgroups, normal subgroups, quotient groups, homomorphisms
- Rings, fields, in particular Z/mZ

Natural numbers, mathematical induction, recursion
- Peano axioms

Mathematical induction
Recursive definitions
Binominal coefficients and binomial formulae
Basic concepts of combinatorics (with quantitative considerations)
Elementary vector calculation in Euclidean space
Vector algebra, linear independence, dimension
Vectors in coordinate systems, dot product, vector product, triple product
Geometric applications
Vectors in n-dimensional space
Generating sets, basis, subspaces
Linear functions, image space, core
Representation of linear functions with matrices
Geometric applications: projections, reflections, rotations
Matrices and linear systems
Linear systems, Gaussian elimination
Square matrices, matrix inversion, determinants, Cramer´s rule

[*updated 26.02.2018*]

Teaching methods/Media:
Lecture. An exercise sheet will be distributed every week and then discussed in small groups the following week. In addition, a tutorial will be available for work in small groups. This is voluntary. In the tutorials, students will be able work on exercises themselves (with support from the tutor, if necessary) and ask questions about the lecture material. The tutorial can also be used to fill knowledge gaps.

[*updated 26.02.2018*]

Recommended or required reading:
- P. Hartmann, Mathematik für Informatiker (Vieweg); can be downloaded via OPAC as a PDF.
- M. Brill, Mathematik für Informatiker (Hanser).

[*updated 26.02.2018*]

Mathematics 2

Module name (EN):
Name of module in study programme. It should be precise and clear.
Mathematics 2

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-MAT2

Hours per semester week / Teaching method:

The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
3V+1U (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-MAT2 (P221-0002) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course
PIB-MA2 (P221-0002) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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. Peter Birkner

Lecturer: Prof. Dr. Peter Birkner

[*updated 07.08.2019*]

Learning outcomes:
_ After successfully completing this module, students will be familiar with the definition of the term _limit_ for sequences and real functions and will
have learned to master the use of limit theorems.
_ They will know the convergence criteria for series and be able to handle them confidently when checking series for convergence.
_ They will be able to explain the importance of series expansion for numerical mathematics and computer science applications.
_ Students will be familiar with the properties of exponential and logarithmic functions and be able to deal with them confidently
in computer science applications.
_ They will know the definition of derivation for functions of a variable as a limit value and
will have learned to master the derivation rules for functions of a variable.
_ Students will be able to develop solutions for the application of differential calculus (setting limits with _L´Hospital´s rule, extreme value tasks, Taylor series
and error estimation).
_ They will be familiar with the definition of definite and indefinite integrals for variable functions, as well as
be able to develop integration solutions using the integration methods _partial integration_ and _integration by substitution_.
_ Finally, they will have learned to master complex numbers in the usual forms for representation.

[*updated 24.02.2018*]

Module content:
Sequences and series
Supremum, infimum, limits, limit theorems
Series, direct comparison test and ratio test
Geometric series, exponential series
Continuity
Function limits
Properties of continuous functions
Inverse functions, logarithms, inverse trigonometric functions
Differential calculus
Concept of derivation, calculation rules
Properties of differentiable functions
Higher derivatives
Monotonicity and convexity
Applications such as Hospital´s rule, extreme value tasks and Taylor series
Integral calculus
Riemann sums, definite integral
Indefinite integral, fundamental theorem of calculus
Integration methods: partial integration, substitution rule
Complex numbers

[*updated 24.02.2018*]

Teaching methods/Media:
Lecture at board Every two weeks an exercise sheet will be distributed and then discussed in small groups the following week. In addition, a tutorial will be offered every two weeks for work in small groups. This is voluntary. In the tutorials, students will be able work on exercises themselves (with support from the tutor, if necessary) and ask questions about the lecture material. The tutorial can also be used to fill knowledge gaps.

[*updated 26.02.2018*]

Recommended or required reading:
- P. Hartmann, Mathematik für Informatiker (Vieweg); can be downloaded via OPAC as a PDF.
- M. Brill, Mathematik für Informatiker (Hanser).

[*updated 19.02.2018*]

Mathematics 3

Module name (EN):
Name of module in study programme. It should be precise and clear.
Mathematics 3

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-MAT3

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+1U (3 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
3

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-MAT3 (P222-0002) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
None.

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Peter Birkner

Lecturer: Prof. Dr. Peter Birkner

[*updated 07.08.2019*]

Learning outcomes:
After successfully completing this course, students will be able to apply the Fourier transform to technical problems such as the analysis of linear filters. They will be able to understand problems related to the functions of several independent variables and to design solutions.

With the help of an introduction to probability calculus, they will be able to process and solve elementary combinatorial and probabilistic questions.

[*updated 26.02.2018*]

Module content:
Complex numbers (advanced)
Fourier series and Fourier transform
  Definitions, properties, examples
  Applications
Functions with several independent variables
  n-dimensional space
  Multivariate function
  Differential calculus
Probability calculus
  The concept of "probability"
  Conditional probability and independent events
  Urn experiments
  Random variables and distribution functions
  Expected value and variance
  Discrete distribution, Poisson distribution, normal (or Gaussian) distribution

[*updated 26.02.2018*]

Recommended or required reading:

[*still undocumented*]

Operating Systems

Module name (EN):
Name of module in study programme. It should be precise and clear.
Operating Systems

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-BS

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+2P (4 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 3

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

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 01.10.2017 , semester 4, mandatory course
PIB-BS (P221-0013) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 4, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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*]

Production and Quality Management

Module name (EN):
Name of module in study programme. It should be precise and clear.
Production and Quality Management

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-MST

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+1P (3 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
3

Semester: 5

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam 90 min.

[*updated 05.11.2020*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

MAB_19_IP_5.05.MST (P241-0278, P241-0279) Mechanical and Process Engineering, Bachelor, ASPO 01.10.2019 , semester 5, mandatory course, Specialization Industrial Production

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisites (modules):
PRI-TFL Manufacturing Process Technology (with Lab Course)

[*updated 04.12.2022*]

Recommended as prerequisite for:

Module coordinator:
Prof. Dr. Jürgen Griebsch

Lecturer: Prof. Dr. Jürgen Griebsch

[*updated 07.08.2019*]

Learning outcomes:
After successfully completing this module, students will be able to master tasks from the fields of technical investment and production planning using their knowledge about production management. They will be able to determine machine availability and machine utilization.

Students will be able to draw up key figure models and interpret them.
They will be familiar with common fields of application in industrial assembly and understand the different assembly principles.
Students will be familiar with the planning, construction and organization of assembly systems.
They will be familiar with the different feeding, transport, handling and gripping systems.
Students will be familiar with the basic principles of quality management and will be able to apply its methods and tools.
They will be able to analyze technical risks and problems.

[*updated 05.11.2020*]

Module content:
Introduction to production management
- Production systems
- Value stream design
- Machine availability
- Key figure systems

Assembly system technology:
- Industrial robots and handling technology
- Basic tasks of the assembly system technology
- Transport systems
- Assembly organization

Introduction to quality management
- Methods and tools for quality management
- Certification, auditing

Machine safety (CE conformity, machinery directive, hazard and risk analysis)

[*updated 05.11.2020*]

Teaching methods/Media:
Instruction with practically-oriented exercise segments, laboratory in small groups

[*updated 05.11.2020*]

Recommended or required reading:
Erlach, K.; Wertstromdesign - Der Weg zur schlanken Fabrik; Springer Verlag, 2010; ISBN: 978-3-540-89866-5

Dickmann, P.; Schlanker Materialfluss; Springer Verlag, 2015; ISBN 978-3-662-44869-4

Coenenberg, A.G., Fischer, T.M., Günther, T.; Kostenrechnung und Kostenanalyse; Schäffer-Poeschel, 2012; ISBN: 978-3-7910-3612-0

Haun, M.; Handbuch Robotik _ Programmieren und Einsatz intelligenter Roboter, Springer Verlag 2013; ISBN 978-3-642-39858-2

Hesse, S., Malisa, V.; Taschenbuch Robotik - Montage - Handhabung; Hanser Verlag, 2016; ISBN: 978-3-446-44365-5

Linß, G.; Qualitätsmanagement für Ingenieure; Hanser Verlag, 2018; ISBN: 978-3-446-44042-5

[*updated 05.11.2020*]

Professional Presentations

Module name (EN):
Name of module in study programme. It should be precise and clear.
Professional Presentations

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-ENG3

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2SU (2 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
2

Semester: 3

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-ENG3 (P222-0028) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course
PIB-EN3 (P221-0029) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course

Suitable for exchange students (learning agreement)

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 07.08.2019*]

Learning outcomes:
Note:
The modules "Business Communication and Intercultural Competence", "Technical Reading and Writing", as well as "Professional Presentations" should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

About the "Professional Presentations" module:
After successfully completing this module, students will understand strategies for the creation of professional, subject-specific presentations in English. They will be able to structure English-language presentations and use the verbal expressions they have mastered in them. In doing so, they will continue to develop their understanding of the functional use of language.
With regard to job application processes, students will be given the opportunity to prepare their application

documents in English, apply and practice interview strategies and develop their intercultural awareness.

[*updated 12.04.2018*]

Module content:
Presentations
- Strategic knowledge
- Structure of a presentation in English
- Structures for linguistic implementation
- Describing tools, numbers, cause and effect correlations, and trends

Applying for a job
- Job advertisement
- Application documents
- Job interview

In addition, we will work on:
Vocabulary
Repeating relevant grammatical structures
Intercultural competence
Raising awareness for functional language use

[*updated 12.04.2018*]

Teaching methods/Media:
Teaching and learning materials (print, audio, video), multimedia teaching and learning software for specific target groups

[*updated 19.02.2018*]

Recommended or required reading:
Students will receive a list of recommended teaching and learning materials.
The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Christine Sick (2015): TechnoPlus Englisch VocabApp (Mobile learning offer, especially for basic vocabulary, all levels), EUROKEY.

Christine Sick, unter Mitarbeit von Miriam Lange (2011): TechnoPlus Englisch 2.0 (Multimediales Sprachlernprogramm für Technisches und Business Englisch, Niveau B1-B2+), EUROKEY.

[*updated 19.02.2018*]

Programming 1

Module name (EN):
Name of module in study programme. It should be precise and clear.

Programming 1

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-PRG1

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
4V+2P (6 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
8

Semester: 1

Mandatory course: yes

Language of instruction:
German

Assessment:

[*still undocumented*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-PRG1 (P222-0029) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 1, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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:

Module coordinator:
Prof. Dr. Martina Lehser

Lecturer: Prof. Dr. Martina Lehser

[*updated 07.08.2019*]

Learning outcomes:
After successfully completing this module, students will be able to explain the concepts of procedural programming and data abstraction and implement them in the C programming language. They will use design techniques to find solutions. They will use their knowledge about programming techniques, to create well-structured and documented programs. They will use basic tools from the field of software development to do so. In the practical course, students will learn to present programs and their solution concepts.

[*updated 19.02.2018*]

Module content:
1. Procedural programming/Data abstraction: Fundamental data types, operators, control structures, functions, pointers and arrays, validity ranges and lifetime of objects

2. Programming techniques: Modularization, separating interfaces and implementation, data structures and algorithms

3. Development tools: Preprocessor, compiler, linker, shell, shell scripts, makefile, debugger

[*updated 19.02.2018*]

Teaching methods/Media:
Combination of lecture and practical exercises in the computer lab, lecture slides and sample exercises in Moodle
Internship assignments will be discussed, prepared and accepted in an audit, individual student coaching in the tutorials

[*updated 19.02.2018*]

Recommended or required reading:
C von A bis Z, Jürgen Wolf: http://openbook.rheinwerk-verlag.de/c_von_a_bis_z/

Die Programmiersprache C. Ein Nachschlagewerk RRZN Hannover

C als erste Programmiersprache; Goll, Bröckl, Hausmann;Springer Viewer 2014

[*updated 19.02.2018*]

Project Management

Module name (EN):
Name of module in study programme. It should be precise and clear.
Project Management

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-PM

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V (2 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
3

Semester: 2

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KI567 Computer Science and Communication Systems, Bachelor, ASPO 01.10.2014 , semester 6, optional course, technical
KIB-PM (P222-0032) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course
PIB-PM (P221-0036) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 3, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 67.5 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 07.08.2019*]

Learning outcomes:
After successfully completing this course, students will be able to reconstruct the project planning for typical and manageable student IT projects in functional project management.

They will be capable of independently implementing an adequate form of project organization and exercising project governance during the continuous project development cycle. They will be able to recognize deviations from the plan and adjust project planning accordingly.

Students will learn to use basic project management tools, i. e. they can create work-breakdown structures, map workflows with the precedence diagram method and understand the consequences of plan changes.

They will learn to prepare and conduct meetings and to communicate their information and the results for efficient project control.

Students will become familiar with estimation processes for IT projects and know how to use them in such projects in order to stabilize project planning.

They will develop an understanding of how to work in project teams and assume project management functions.

[*updated 19.02.2018*]

Module content:
Definitions of project and project management
Projects and project management in companies

Project management tools
Special features of software projects
- Information and communication
- Cost estimation
- Collaborative software

[*updated 19.02.2018*]

Teaching methods/Media:
Lecture, simulations and workshop
Lecture script available as a PDF download

[*updated 19.02.2018*]

Recommended or required reading:
BURGHARDT M.: Projektmanagement, Publics MCD Verlag, 2000
WESTERMANN R.: Projektmanagement mit System, Gabler Verlag, 2001
MOTZEL E.+PANNENBÄCKER O.:Projektmanagement-Kanon, Roderer Verlag, 2002 TURNER M.: Microsoft Solutions Framework Essentials; Building Successful Technology Solutions, Microsoft Press ISBN-10:0-7356-2353-8
WIECZORREK W., MERTENS P.: Management von IT-Projekten, SpringerLink Verlag ISBN-978-3-642-16126-1
BOHINC T.: Führung im Projekt, SpringerLink Verlag ISBN-978-3-642-22625-0 BERGMANN R, BARRECHT M.: Organisation und Projektmanagement, SpringerLink Verlag ISBN-978-3-7908-2017-1
KÖNIGS H.-P.: IT-Risikomanagement mit System, SpringerLink Verlag ISBN-ISBN 978-3-8348-1687-0

[*updated 19.02.2018*]

Security Engineering

Module name (EN):
Name of module in study programme. It should be precise and clear.
Security Engineering

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-SE

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2V+2P (4 hours per week)

ECTS credits:

European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
5

Semester: 4

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam

[*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

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 01.10.2017 , semester 4, mandatory course
PIB-SE (P222-0039) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 4, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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*]

Technical Reading and Writing

Module name (EN):
Name of module in study programme. It should be precise and clear.
Technical Reading and Writing

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-TEM

Hours per semester week / Teaching method:

The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
2SU (2 hours per week)

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
2

Semester: 2

Mandatory course: yes

Language of instruction:
English/German

Assessment:
Written exam

[*updated 19.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

KIB-ENG2 (P222-0043) Computer Science and Communication Systems, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course
PIB-EN2 (P222-0043) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 2, mandatory course

Suitable for exchange students (learning agreement)

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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:

Module coordinator:
Prof. Dr. Christine Sick

Lecturer: Prof. Dr. Christine Sick

[*updated 07.08.2019*]

Learning outcomes:
Note:
The modules "Business Communication and Intercultural Competence", "Technical Reading and Writing", as well as "Professional Presentations" should be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

About the "Technical Reading and Writing" module:
After successfully completing this module, students will be familiar with different reading strategies and will be able to apply them to course-specific specialist texts. They will have extended their repertoire of linguistic structures and will be able to apply these structures to the written elaboration of technical questions and documents.

[*updated 12.04.2018*]

Module content:
- General and detailed comprehension of course-specific specialist texts
- Techniques for taking notes
- Summarizing texts
- Describing for example, program actions, program functions, instructions, etc.
- Cause-effect relationships

In addition, we will work on:
- Vocabulary
- Repeating relevant grammatical structures

[*updated 12.04.2018*]

Teaching methods/Media:
Teaching and learning materials (print, audio, video), multimedia teaching and learning software for specific target groups

[*updated 19.02.2018*]

Recommended or required reading:
Students will receive a list of recommended teaching and learning materials.
The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Christine Sick (2015): TechnoPlus Englisch VocabApp (Mobile learning offer, especially for basic vocabulary, all levels), EUROKEY.

Christine Sick, unter Mitarbeit von Miriam Lange (2011): TechnoPlus Englisch 2.0 (Multimediales Sprachlernprogramm für Technisches und Business Englisch, Niveau B1-B2+), EUROKEY.

[*updated 26.02.2018*]

Work Experience Phase

Module name (EN):
Name of module in study programme. It should be precise and clear.
Work Experience Phase

Degree programme:
Study Programme with validity of corresponding study regulations containing this module.
Production Informatics, Bachelor, ASPO 01.10.2021

Module code: PRI-PRA

Hours per semester week / Teaching method:
The count of hours per week is a combination of lecture (V for German Vorlesung), exercise (U for Übung), practice (P) oder project (PA). For example a course of the form 2V+2U has 2 hours of lecture and 2 hours of exercise per week.
-

ECTS credits:
European Credit Transfer System. Points for successful completion of a course. Each ECTS point represents a workload of 30 hours.
15

Semester: 6

Mandatory course: yes

Language of instruction:
German

Assessment:
Study report, presentation

[*updated 26.02.2018*]

Applicability / Curricular relevance:
All study programs (with year of the version of study regulations) containing the course.

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 01.10.2017 ,

semester 6, mandatory course
PIB-PRA (S221-0173) Applied Informatics, Bachelor, ASPO 01.10.2017 , semester 6, mandatory course

Workload:
Workload of student for successfully completing the course. Each ECTS credit represents 30 working hours. These are the combined effort of face-to-face time, post-processing the subject of the lecture, exercises and preparation for the exam.

The total workload is distributed on the semester (01.04.-30.09. during the summer term, 01.10.-31.03. during the winter term).
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 07.08.2019*]

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 26.02.2018*]

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*]

Production Informatics Bachelor - optional courses