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Faculty of Computer Science and
Business Information Systems
Technical University of
Applied Sciences
Würzburg-Schweinfurt

Module Handbook
Bachelor E-Commerce (B. Sc.)

Winter semester 2026
Summer semester 2026

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1. semester

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Module: 6150030
Backend Programming

Module profile

Exam number
6150030

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tristan Wimmer

Lecturer(s)
Prof. Dr. Tristan Wimmer, Christine Zilker

Applicability	BEC
Semester according to SPO	1. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This module aims to teach students the basics of programming using the Python programming language. It introduces the fundamental concepts of programming languages and programming paradigms, and lays the foundations for further modules in the degree programme.
The following topics are covered:

- Basic data types, data structures and operators
- Control structures: loops and conditional statements
- Programming with functions
- Introduction to object-oriented programming
- Introduction to the concept of inheritance
- Introduction to exception handling

In addition to these topics, this module highlights appropriate ways of structuring code, as well as documentation techniques for a clean and readable programming style. Furthermore, students are shown how best to tackle and solve problems.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to identify and name the basic data types, data structures and operators, and apply them in the Python programming language.

- Students will be able to explain how control structures such as loops and conditional statements control the flow of programmes and how these are implemented in Python.
- Upon successful completion of the module, students will be able to write simple Python programmes that use functions and parameter passing to solve specific tasks, applying the 'divide and conquer' principle.
- Students will be able to apply object-oriented programming to improve the structure and maintainability of a programme through encapsulation.
- Upon successful completion of the module, students will be able to design and implement an object-oriented programme in Python for a specific requirement, utilising the fundamental principles of inheritance.
- Upon successful completion of the module, students will be able to apply exception handling for incorrect inputs and data type incompatibilities.

Literature
Häberlein, Tobias. Programming with Python: An Introduction to Procedural, Object-Oriented and Functional Programming. 1st ed. 2024. Berlin, Heidelberg: Springer Berlin Heidelberg, 2024. https://doi.org/10.1007/978-3-662-68678-2.

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Module: 6150040,6920020 Discrete Mathematics and Linear Algebra

Module profile

Exam number
6150040,6920020

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Patrik Stilgenbauer

Lecturer(s)
Prof. Dr. Patrik Stilgenbauer

Applicability	BEC, BDGD
Semester according to SPO	1. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
School maths

Content
Linear Algebra:
Systems of linear equations, matrices, vectors, dot product, matrix operations, inverse matrices, determinants.

Logic:
Logical operators, truth tables, propositional algebra, normal forms.

Number Theory:
Modulo arithmetic, extended Euclidean algorithm, Euler–Fermat's theorem, RSA encryption.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes

- Students are familiar with fundamental concepts and techniques from the mathematical fields of propositional logic, number theory and linear algebra.
- Students understand the significance of mathematical methods and their role in applications within the fields of business informatics and e-commerce, such as in the calculation of IBAN check digits, the implementation of the RSA public-key encryption scheme, and the simplification of complex logical expressions in conditional queries within programmes.
- Students apply mathematical techniques to solve practical problems in the fields of business informatics and e-commerce.
- Students analyse mathematical problems in the fields of propositional logic, number theory and linear algebra in order to develop and implement suitable solution strategies.
- Students evaluate different solution strategies in terms of their effectiveness and efficiency in solving specific mathematical problems.
- Students devise their own solution strategies to successfully tackle mathematical problems.

Literature

Bartholomé, Andreas; Rung, Josef; Kern, Hans: Number Theory for Beginners; Vieweg + Teubner, Wiesbaden
Beutelspacher, Albrecht; Zschiegner, Marc-Alexander: Discrete Mathematics for Beginners; Vieweg + Teubner, Wiesbaden
Brill, Manfred: Mathematics for Computer Scientists; Hanser Verlag; Munich/Vienna
Gramlich, Günter: Linear Algebra – An Introduction; Fachbuchverlag Leipzig, part of Carl Hanser Verlag
Hartmann, Peter: Mathematics for Computer Scientists; Vieweg + Teubner, Wiesbaden
Papula, Lothar: Mathematics for Engineers and Scientists 1 and 2; Vieweg + Teubner; Wiesbaden
Pommersheim, James E.; Marks, Tim K.; Flapan, Erica L.: Number Theory: A Lively Introduction with Proofs, Applications, and Stories; John Wiley & Sons
Schubert, Matthias: Mathematics for Computer Scientists; Vieweg + Teubner, Wiesbaden

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Module: 6150060
Fundamentals of Business Administration with Accounting

Module profile

Exam number
6150060

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Eva Wedlich

Lecturer(s)
Prof. Dr. Eva Wedlich,
Christian Holleber

Applicability	BEC
Semester according to SPO	1. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Fundamentals of Business and Economics
- The significance of economic activity, types of goods, economic principles
- Economic sectors and factors of production

Key Performance Indicators for Business Management
- Productivity, profitability, return on equity, return on total capital, return on turnover

Site selection: criteria and decision-making factors
Legal forms of business organisations
- Partnerships and limited companies, advantages and disadvantages

Fundamentals of management accounting
- Functions, structures, basic concepts of bookkeeping and cost accounting

Price formation in markets
- Household demand, firm supply, market mechanisms

National Accounts: Structure and significance
Macroeconomic objectives: The ‘magic square’ and conflicting objectives

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- define and explain the fundamental terms and concepts of business administration and economics,
- understand the economic principle and significance of scarcity and apply it to practical examples,
- to calculate, interpret and critically compare key business performance indicators,
- to distinguish between different forms of company law and assess their suitability,
- to apply the fundamentals of accounting, in particular for recording and analysing economic data,
- to analyse the market mechanisms of supply and demand and assess their influence on price formation,
- to contextualise and critically reflect upon the national accounts and key economic policy objectives.

Literature
Wöhe, G.; Döring, U.: Introduction to General Business Administration, current edition
Schmalen, H.; Pechtl, H.: Fundamentals and Issues in Economics, latest edition
Coenenberg, A. G.; Haller, A.: Annual Accounts and Financial Statement Analysis, latest edition
plus up-to-date lecture notes, statutory texts and course materials

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Module: 6150050
User Experience and Consumer Psychology

Module profile

Exam number
6150050

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele,
Prof. Dr. Mila Vogelsang

Applicability	BEC
Semester according to SPO	1. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Usability and interface design in relation to web applications.

- Fundamentals of website usability and user experience (DIN standards, heuristics)
- Information architecture

Navigation concepts (mobile / desktop)
Internal search
Mental models
Information reception and processing (including cognitive biases)

- Website design

Impact of images and text
Layout / colour impact
Multi-device design considerations

- Text on the web
- Prototyping: Creating prototypes to develop high-quality user interfaces using prototyping tools
- Usability testing

Test preparation and execution
Various testing and evaluation approaches for assessing user acceptance
Design of ordering and payment flows

- Conversion optimisation

A/B and multivariate testing

- Web accessibility
- Exercise: Methods of prototyping and usability evaluation using practical examples

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Students
- understand the fundamental criteria for user-centred web design, web usability and accessibility.
- understand the basic theoretical concepts underlying the development of web-based user interfaces, drawing on consumer psychology and their relevance to different end devices.
- apply principles of information structuring and psychology to design user-friendly websites.
- analyse existing web interfaces in terms of usability, user guidance and accessibility.
- evaluate web design decisions in terms of user acceptance, mobile use and accessibility.
- create simple web-based user interfaces, taking into account usability and accessibility criteria.
- develop concepts for the ongoing optimisation and performance monitoring of web applications.

Literature
Alan Cooper, Robert Reimann, Dave Cronin: About Face: The Essentials of Interaction Design, Wiley Publishing, Inc., 2007
Florian Sardornik, Henning Brau: Methods of Usability Evaluation: Scientific Foundations and Practical Application, Huber, Bern; 2nd edition 2011
Jakob Nielsen, Hoa Loranger: Web Usability, Addison-Wesley, German edition, 2006
Jakob Nielsen: Usability Engineering, Morgan Kaufmann, 1993
Markus Bühner: An Introduction to Testing and Questionnaire Design, Pearson Studium, 2nd edition 2006
Michael Richter, Markus Flückiger: Usability Engineering in a Nutshell: Developing Usable Products in a Targeted Manner, Springer, 3rd edition 2013.
Steve Krug: Don’t Make Me Think, New Riders, 3rd edition, 2013
Steve Krug: Rocket Surgery Made Easy, New Riders, 1st edition, 2010

Module: 6150020
Webanalytics

Module profile

Exam number
6150020

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Mila Vogelsang

Lecturer(s)
Prof. Dr. Mila Vogelsang

Applicability	BEC
Semester according to SPO	1. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In this module, students acquire practical knowledge in the field of web analytics. They learn how to collect and analyse usage data from websites and apps effectively and in compliance with data protection regulations, and to derive strategic measures for optimising e-commerce websites from this data. The module covers technical fundamentals, analytical concepts and the use of modern tools such as Google Analytics 4 (GA4) and data-protection-friendly alternatives.

Specifically, this module deals with
- The objectives and benefits of web analytics in e-commerce (engagement, customer journey, conversions)
- Technical and organisational frameworks for data collection, such as HTTP cookies, consent management, and the GDPR / TTDSG
- Selection and definition of suitable key performance indicators (KPIs)
- Analytics tools and technical implementation options

- Client-side web analytics (e.g. Google Analytics 4, Plausible Analytics)
- Tag management systems, including server-side tagging (e.g. GA4 Server Container)

- Log-file-based analysis methods
- Management and optimisation of (online) marketing campaigns through appropriate analysis
- Comparison and application of various attribution models
- Introduction to dashboards, reporting and visualisation of analysis results (e.g. using Looker Studio, Tableau)

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- apply common analytical methods to e-commerce websites in a targeted manner
- define Key Performance Indicators (KPIs) based on individual requirement profiles and implement their collection and analysis using GA4
- to distinguish between various web analytics techniques (e.g. attribution, funnel analysis, heatmaps) in terms of their suitability for and informative value in specific e-commerce scenarios
- to critically assess the impact of web analytics techniques on users' data protection
- Strategically plan the use of web analytics technologies in an e-commerce context and assess existing implementations in terms of goal achievement and technical aspects

Literature
Kaushik, A. (2010). Web analytics 2.0: The art of online accountability and the science of customer centricity. Wiley. ISBN: 978-0-470-59644-9

Chaffey, D., & Ellis-Chadwick, F. (2022). Digital marketing (8th ed.). Pearson. ISBN: 978-1-292-40099-0

Solmecke, C. (2023). Legal aspects of online marketing. Rheinwerk Computing. ISBN 978-3-8362-9601-4

Tool documentation:

- https://skillshop.withgoogle.com/ (Google Platform)
- https://support.google.com/analytics/answer/10089681 (GA4)
- https://plausible.io/docs (GA4 alternative)
- https://developers.google.com/tag-platform/tag-manager?hl=de (GTM)

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Module: 6150010
Website Development and Accessibility

Module profile

Exam number
6150010

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Dr. Tobias Aubele, Prof. Dr. Rolf Schillinger, Jannik Fuhr

Applicability	BEC
Semester according to SPO	1. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In this module, students will learn about the fundamental activities, knowledge and tools required to create modern and accessible websites. They will acquire the skills to design simple websites from scratch, implement them using WordPress as a content management system, and finally publish them online. Particular emphasis is placed on incorporating accessibility at an early stage in accordance with the Web Content Accessibility Guidelines (WCAG). Throughout all phases, the latest AI tools are used to create and optimise content and structures efficiently.

Specifically, this module covers

- The basics of HTML and CSS (semantics, structure, design, responsiveness)
- An introduction to content management systems, in particular WordPress
- The use of AI for creating and optimising websites
- The basics of web hosting
- An introduction to digital accessibility and the application of the WCAG 2.1/2.2 guidelines

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- independently create simple, standards-compliant websites using HTML and CSS
- to publish the websites they have created online independently
- to use Large Language Models (LLMs) in a targeted manner to generate the technical foundations and specific content for WordPress-based websites
- apply the basic requirements of the Web Content Accessibility Guidelines (WCAG 2.1/2.2) when creating new websites
- systematically analyse and evaluate existing websites in terms of their accessibility

Literature
Google Developers (https://web.dev)

Grigorik, I. (2013). High Performance Browser Networking: What every web developer should know about networking and web performance. O'Reilly Media. ISBN 978-1-4493-4476-4, available online: https://hpbn.co/
Mozilla Developer Network (https://developer.mozilla.org/de/)
Müller, P. (2022). An Introduction to HTML and CSS: Programming and Designing Websites (2nd ed.). Rheinwerk Verlag. ISBN 978-3-8362-9089-0
Springer, S. (2022). React: The Comprehensive Guide to Modern Front-end Development. With Practical Examples on Redux, TypeScript, SSR and PWAs (2nd ed.). Rheinwerk Verlag. ISBN 978-3-8362-9254-2
W3C. (2023). Web Content Accessibility Guidelines (WCAG) 2.2. World Wide Web Consortium (W3C). https://www.w3.org/TR/WCAG22/

2. semester

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Module: 9999999
General Compulsory Elective

Module profile

Exam number
9999999

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Jochen Seufert

Lecturer(s)
Beate Wassermann

Applicability	BEC, BISD, BDGD
Semester according to SPO	2. semester
Type of module	AWPM

Required prerequisites for the participation in the module according to the SPO
As a rule, none; exceptions are determined and announced by the Faculty of Applied Natural Sciences and Humanities.

Recommended prerequisites for the participation in the module
none

Content
A choice of two compulsory elective general science modules (AWPF) (2 x 2 SWS) or one AWPF (1 x 4 SWS) from the range of modules offered by the Faculty of Applied Natural Sciences and Humanities (FANG).

Subjects offered by FANG in the following areas:
- Languages
- Cultural Studies
- Natural Sciences and Technology
- Politics, Law and Economics
- Education, Psychology and Social Sciences
- Soft Skills
- Creativity and Art.

Courses whose content is already included in, or directly related to, parts of other modules within the degree programme are excluded from the FANG course catalogue. The relevant courses are marked as ‘restricted’ in the FANG course catalogue.
The content of the individual AWPFs is published on the FANG faculty website.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
The subject-specific learning objectives depend on the specific AWPFs selected. Students

- also acquire knowledge and skills that are not subject-specific but may be relevant to their intended career path, such as specialised knowledge of foreign languages, the natural sciences or the social sciences
- analyse a wide variety of issues
- place subject-specific knowledge within an interdisciplinary context
- apply what they have learnt to their current training
- have expanded their key competences and, where applicable, their foreign language skills, thereby supporting their personal development, including from an intercultural perspective
- are aware of their responsibilities in personal, social and ethical terms.

Literature
depending on the selected AWPFs

Module: 6150100
Analysis

Module profile

Exam number
6150100

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Patrik Stilgenbauer

Lecturer(s)
Prof. Dr. Patrik Stilgenbauer

Applicability	BEC
Semester according to SPO	2. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
School Mathematics, Discrete Mathematics and Linear Algebra

Content
Complex numbers
Elementary functions and properties of functions
Differential calculus in one and several variables
Integral calculus in one variable
Applications of calculus in financial mathematics

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Fundamentals of Mathematics and Natural Sciences:
Students acquire in-depth knowledge of key concepts and techniques in calculus. In particular, they will master fundamental methods of differential and integral calculus, which are required, amongst other things, for subjects such as statistics (particularly probability theory) and as the basis for operations research.

Ability to develop and implement solution strategies:
Students are able to analyse typical problems in differential and integral calculus and to develop and implement appropriate solution strategies. By working independently on exercises, the methodological skills acquired in the course 'Discrete Mathematics and Linear Algebra' are further developed.

Ability to think logically, analytically and conceptually:
By understanding mathematical texts and systematically working through mathematical problems, students further develop their ability to think abstractly, logically and analytically.

Literature
Brill, Manfred: Mathematics for Computer Scientists; Hanser Verlag; Munich/Vienna.
Hartmann, Peter: Mathematics for Computer Scientists; Vieweg + Teubner, Wiesbaden.
Ihrig, Holger; Pflaumer, Peter: Financial Mathematics – Intensive Course; Oldenbourg Verlag; Munich.
Oberguggenberger, Michael and Ostermann, Alexander: Analysis for Computer Scientists, Springer Vieweg, Berlin.
Papula, Lothar: Mathematics for Engineers and Natural Scientists 1 and 2, Vieweg + Teubner, Wiesbaden.
Schubert, Matthias: Mathematics for Computer Scientists, Vieweg + Teubner, Wiesbaden.
Teschl, Gerald and Teschl, Susanne: Mathematics for Computer Scientists – Volume 2 (Analysis and Stochastics), Springer Vieweg.
Tietze, Jürgen: Introduction to Financial Mathematics, Vieweg + Teubner, Wiesbaden.

Module: 6150090
Cloud and Infrastructure

Module profile

Exam number
6150090

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Dr. Rolf Schillinger, Christine Zilker

Applicability	BEC
Semester according to SPO	2. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This module begins by covering the fundamentals of network communication, before building on this foundation to introduce key concepts in modern cloud technologies.

In particular, the following topics are covered:

- Communication processes in an IP environment
- Functions of the physical layer
- Structure and operation of various Ethernet protocols

- Use of auxiliary protocols such as ICMP, ARP and DNS

- TCP/IP application protocols
- Fundamentals of HTTP, HTTP caching and tuning, and HTTP cookies
- Fundamentals of secure communication via TLS and an introduction to PKI
- Cloud computing and operating models

- Introduction to service models: IaaS, PaaS (e.g. using Microsoft Azure as an example) and SaaS
- Characteristics and areas of application of public, private and hybrid clouds

- Containerisation and modern deployment
- Basic principles of containerisation
- Kubernetes as an example of an orchestration solution in a container environment

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will be able to

- describe and analyse communication between devices and applications within a TCP/IP network
- explain the key communication processes in an IP environment (e.g. addressing and routing)
- to distinguish between the key protocols of the TCP/IP application layer (e.g. HTTP, HTTPS, DNS, …)
- to distinguish between the various cloud operator models (IaaS, PaaS, SaaS, public/hybrid/private cloud) and deploy them appropriately
- to plan, implement and evaluate the deployment of a simple web application in a cloud environment

Literature
Grigorik, I. (2013). High Performance Browser Networking: What every web developer should know about networking and web performance. O'Reilly Media. ISBN 978-1-4493-4476-4, Available online: https://hpbn.co/
Mozilla Developer Network (https://developer.mozilla.org/de/)
Tanenbaum, A. S., & Bos, H. (2014). Modern operating systems (4th ed.). Pearson International. https://elibrary.pearson.de/book/99.150005/9781292061955. ISBN 978-1-292-06195-5
Turnbull, J. (2021). The Docker book: Containerisation is the new virtualisation (latest ed.). Self-published. ISBN 978-0988820203

Module: 6101810
Statistics

Module profile

Exam number
6101810

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Patrik Stilgenbauer

Lecturer(s)
Prof. Dr. Patrik Stilgenbauer

Applicability	BEC
Semester according to SPO	2. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Descriptive statistics:
- Basic concepts
- Frequency distributions
- Measures of central tendency, measures of dispersion, measures of concentration
- Linear correlation and regression analysis
- Spearman's correlation (with application to SEO)
- Time series analysis
- Preparation and presentation of statistical results using Excel and R

Probability Theory:
- Sample space, events, the concept of probability
- Conditional probability and independence
- Combinatorics
- Law of total probability and Bayes' theorem
- Law of large numbers
- Discrete and continuous random variables (in particular, binomial and normal distributions)
- de Moivre–Laplace limit theorem

Inferential Statistics:
- Estimation methods
- Significance tests
- A/B tests and multivariate test procedures

Application and visualisation of statistical methods through programming examples in Excel and R

Examination

Required prerequisites for the participation in the examination according to the SPO appendix

-

Examination - type

Written exam (sP) according to § 23 APO

Examination - length/format

90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination

German

Condition for the award of credit points

-

Learning outcomes

Students acquire a basic understanding of descriptive statistics, probability theory and inferential statistics. They are able to apply statistical methods to data preparation, data analysis and hypothesis testing in the field of e-commerce. Furthermore, they recognise the importance of statistical analysis in a business context and are able to interpret statistical results appropriately.

The module contributes to the following areas of competence within the degree programme:

Mathematical and scientific foundations: Understanding fundamental mathematical concepts underlying statistical methods.

Problem-solving skills: Deriving and applying suitable statistical methods to address data-related issues.

Methodological competence: Structured selection and confident application of fundamental statistical methods, as well as the promotion of analytical and logical thinking.

Practical experience and professional competence: Application of statistical methods to practical issues in e-commerce.

Literature

Bamberg, G., Baur, F. and Krapp, M.: Statistics, De Gruyter Oldenbourg, 2022.
Bourier, G.: Descriptive Statistics, Springer Gabler, 2025.
Bourier, G.: Probability Theory and Inferential Statistics, Springer Gabler, 2018.
Henze, N.: Stochastics for Beginners, Vieweg + Teubner, 2011.
Kurt, N.: Probability Theory for Computer Scientists, Springer Vieweg, 2020.
Teschl, G. and Teschl, S.: Mathematics for Computer Scientists – Volume 2 (Analysis and Probability Theory), Springer Vieweg, 2014.

Module: 6150070
System Communication

Module profile

Exam number
6150070

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tristan Wimmer

Lecturer(s)
Prof. Dr. Tristan Wimmer

Applicability	BEC
Semester according to SPO	2. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
The System Communication module teaches fundamental and practical skills in the field of technical communication between software systems. The focus is on understanding how modern applications and services exchange data, provide functions and are integrated via interfaces (APIs).

Students learn about different types of interfaces, including REST, GraphQL, SOAP and file-based interfaces (e.g. CSV/XML via FTP or API). The advantages and disadvantages, areas of application and typical challenges associated with integration are examined both theoretically and practically.

A specific application context is the integration of Product Information Management (PIM) systems, as used in practice for the management and distribution of product data. This includes, amongst other things, communication with online shops, ERP systems or external data sources via APIs.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon completion of the module, students will be able to:

- apply different types of interfaces,
- understand the structure and function of APIs in general,
- analyse and utilise common communication protocols and data formats (e.g. HTTP, JSON, XML, CSV),
- to consume APIs using Python,
- to understand the role of PIM systems within system landscapes and to implement their integration via APIs,
- to take security aspects such as authentication (e.g. API keys, OAuth2) into account when using interfaces,
- to identify and resolve typical sources of error and integration issues.

Literature
Ritter, Thomas (2021): Understanding Interfaces and APIs – A Practical Introduction
Hepp, Martin (ed.): Product Information Management – Fundamentals, Concepts, Systems

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6150080
Web Design and Prototyping

Module profile

Exam number
6150080

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Prof. Dr. Christina Völkl-Wolf, Marius Müller

Applicability	BEC
Semester according to SPO	2. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This module provides a basic introduction to key concepts, theories and methods in visual communication and web-based design. It focuses on the perception and impact of visual design in digital media, as well as its structured, user-centred application in web and mobile interfaces.

Students acquire fundamental and initial in-depth skills in the design of digital interfaces and in prototyping using the web-based design and collaboration tool Figma. They explore key design concepts from morphology, colour theory, typography, semiotics and systems of writing and symbols, and learn to apply these concepts specifically to web interfaces, campaigns and interactive prototypes. Particular emphasis is placed on the critical reflection on the impact of visual design elements, as well as on the analysis of existing digital design work and websites.

Practical exercises form the didactic backbone of the module. These include exemplary image and interface analyses, design exercises to replicate and vary existing interfaces, as well as manual and digital design tasks. Students progress through all the fundamental phases of the digital design process – from wireframes through structured layouts to clickable high-fidelity prototypes. In doing so, they apply fundamental UI/UX principles, develop interactive user flows and utilise design components, auto-layout and variables to ensure consistent design.

In addition to technical and design skills, communication skills as well as presentation and reflection skills are specifically fostered.

Practical case study: science4all competition
As part of the module, students undertake a practice-oriented competition (science4all) on varying topics. The aim is to develop a digital platform for the clear and engaging visualisation of scientific or socially relevant content.
Students analyse existing applications and best practices, develop a design and content concept based on this, and implement it in Figma in the form of wireframes and clickable prototypes. The practical case

study involves the design of web interfaces, interactive user flows and, where appropriate, accompanying digital campaigns.
The project requires structured documentation of the design process, reflection on design decisions, and the presentation of the results in a final pitch. Both design quality and user-centredness, as well as conceptual rigour, will be assessed.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will have achieved the following learning outcomes:
Students will be able to recall key terms, concepts and terminology relating to visual communication, web design and UI/UX design.
Students understand the impact of form, colour, typography, interaction and visual structure on perception, user experience and the usability of digital interfaces.
Students apply fundamental methods and principles of user-centred design when designing web interfaces, campaigns and mobile applications.
Students use Figma as a collaborative design and prototyping tool to create low- and high-fidelity prototypes using components, auto-layout and variables.
Students analyse existing websites and digital interfaces in terms of design quality, structure, interaction and user guidance.
Students evaluate their own and others' prototypes based on fundamental usability criteria, best practices and initial user feedback.
Working in teams, students create user-centred, interactive prototypes and present them in a structured and clear manner using appropriate presentation formats.

Literature
Web Design & UX/UI Design:

- Krug, Steve (2014). Don't Make Me Think: A Common Sense Approach to Web Usability. New Riders.
- Garrett, Jesse James (2011). *The Elements of User Experience: User-Centred Design for the Web and Beyond*. New Riders.
- Norman, Don (2013). The Design of Everyday Things. Basic Books.
- McElroy, Kathryn (2016). Prototyping for Designers. O'Reilly. Soegaard, Mads (n.d.). The Basics of User Experience Design. Interaction Design Foundation (online)

3. semester

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6150160
CRM with Business Game

Module profile

Exam number
6150160

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Prof. Dr. Tobias Aubele,
Prof. Dr. Christina Völkl-Wolf,
Prof. Dr. Mila Vogelsang

Applicability	BEC
Semester according to SPO	3. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In this module, students acquire theoretical and practical knowledge of the systematic development, maintenance and management of customer relationships in the digital age.
Key topics include customer value analysis, segmentation, lifecycle management, personalisation, customer journey mapping and the use of CRM systems in sales, marketing and service.

A key feature of the module is a practical business simulation in which students work in teams to take charge of the operational and strategic management of a CRM process. In doing so, they make decisions on matters such as customer communication and process optimisation. Through the simulation, participants experience first-hand the impact of their actions on, for example, customer satisfaction and revenue growth.

In addition to the business simulation, students explore current CRM technologies as well as ethical and data protection issues relating to the handling of customer data. The aim is to develop the ability to understand and apply CRM as an integral part of a digital business strategy.

The business simulation takes place over two days as part of the module.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes

- Students identify key CRM concepts such as customer value, segmentation and the customer journey.
- They explain how CRM systems work and describe their use in marketing, sales and customer service.
- They use CRM tools in a simulation exercise, develop customer strategies and optimise processes throughout the customer journey.
- They analyse customer data, distinguish between different segmentation approaches and evaluate their impact in the business simulation.
- They assess CRM measures in terms of customer satisfaction, data protection and economic relevance.
- They plan integrated CRM strategies and develop innovative solutions for real or simulated scenarios.

Literature

Homburg, C., Schäfer, H., & Schneider, J. (2022). Customer Relationship Management: Strategies – Concepts – Tools (6th ed.). Springer Gabler.
Wirtz, B. W. (2023). Digital Business and E-commerce: Fundamentals, Business Models and Tools of the Digital Economy (10th ed.). Springer Gabler.
Sterne, J. (2021). Artificial Intelligence for Marketing: Practical Applications. Wiley.
Salesforce. (2023). State of the Connected Customer (7th ed.). Salesforce Research.
HubSpot. (2024). CRM Software Guide and Trends 2024. HubSpot.
Bitkom. (2023). Customer Experience in the Digital Age: Study and Recommendations for Action. Bitkom e. V.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6102700
Mobile Systems and Applications

Module profile

Exam number
6102700

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Karsten Huffstadt

Lecturer(s)
Prof. Dr. Karsten Huffstadt

Applicability	BEC
Semester according to SPO	3. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In the 'Mobile Systems and Applications' module, students develop the ability to understand, critically examine and apply mobile technologies and ubiquitous systems in the context of digital business processes. The module focuses on both the technological fundamentals of mobile platforms and design- and user-centred aspects.

Specifically, the following topics are covered:

- Introduction to mobile operating systems and app ecosystems
- Device classes and platforms (smartphones, tablets, wearables)
- Mobile application architecture (client/server, WebView, cross-platform)
- Development of graphical user interfaces (UI/UX design principles)
- Access to device sensors (GPS, camera, accelerometer, etc.)
- Mobile APIs and data communication (RESTful services, JSON)
- Introduction to frameworks and development environments (Flutter, Android SDK, etc.)
- Data protection, security and performance aspects in mobile applications
- Project work on the design of a mobile application

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
By the end of the semester, students will be able to...

- recall relevant theories, models and methods in digital business and contextualise them within the research question (to remember)
- analyse the state of the art in research and explain the significance of key terms, concepts and interrelationships (to understand)
- apply academic methods and models specifically to a practical or research topic (to apply)
- systematically break down complex problems and critically evaluate data and sources of information (to analyse)
- assess research findings, methods and sources in terms of validity, relevance and significance (to evaluate)
- design, structure and produce an independent academic piece of work that delivers new insights for research or practice in the field of digital business (to create)

Literature
Zettel, J. (2021). Mobile Computing: Fundamentals – Concepts – Applications. Springer Vieweg.
Schmidt, A. & Kranz, M. (2017). Mobile Interaction: Fundamentals, Design and Development of Mobile Applications. De Gruyter Oldenbourg.
Broy, M. (ed.) (2019). Ubiquitous Computing – Fundamentals, Applications and Challenges. Springer Vieweg.
Nazaré, A. (2023). Flutter for Beginners: An Introductory Guide to Building Cross-Platform Mobile Applications with Flutter and Dart 3. Packt Publishing.
Mednieks, Z., Dornin, L., Meike, G., & Nakamura, M. (2021). Programming Android: Java + Kotlin Edition. O'Reilly Media.
Möller, A. (2020). Practical Guide to Mobile App Development: Concepts, Design, Implementation. Carl Hanser Verlag.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6102210
Online-Marketing

Module profile

Exam number
6102210

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Prof. Dr. Christina Völkl-Wolf,
Prof. Dr. Mila Vogelsang

Applicability	BEC
Semester according to SPO	3. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In this module, students gain in-depth knowledge of key strategies, tools and success factors in online marketing. They learn how companies attract, retain and convert customers in the digital space – using measures such as search engine marketing (SEO/SEA), email marketing, affiliate strategies, etc. In addition, trends in content marketing, performance marketing and data-driven campaign management are explored.

A key component of the module is a practical project with real-world companies, in which students work in teams to develop, implement and present a concrete online marketing strategy. This includes, amongst other things, market analysis, target audience definition, action planning and the selection of suitable channels and tools. Collaboration with industry partners provides an authentic insight into the practical realities of digital marketing in a business context.
The aim of the module is to gain a holistic understanding of strategic and operational online marketing and to apply this knowledge – from planning through to implementation and data-driven performance monitoring.

1. Strategy & Fundamentals: Market analysis, target audiences (customer journey) & data protection
2. Channels & Tools: SEO/SEA, GEO, content, email & affiliate marketing, and more
3. Performance & Data: Campaign management, key performance indicators & performance monitoring
4. Practical project “Online Marketing Challenge”: Teamwork, strategy development & presentation with industry partners (2 SWS)

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes

- strategically position key online marketing tools and apply them in a targeted manner,
- develop an online marketing strategy taking into account market analysis, target audiences and the customer journey,
- select and justify suitable digital channels and tools for implementing and managing marketing activities,
- interpret data-driven performance metrics and derive measures for optimisation,
- observe data protection and the legal framework in online marketing: be familiar with the key legal regulations and provisions governing online marketing.
- design, implement and present a real-world marketing task in collaboration with a partner organisation,
- develop practical solutions as part of a team and communicate them professionally.

Literature

Bruhn, M. (2022). Digital Marketing: Fundamentals, Tools, Practical Examples (3rd ed.). Vahlen.
Faber, H., & Bachem, M. (2022). Online Marketing: The Comprehensive Practical Handbook on Strategy, SEO, SEA, Email, Content, Performance & More (3rd ed.). Rheinwerk.
Meier, A., & Stormer, H. (2020). E-Business & E-Commerce Management (4th ed.). Springer Gabler. https://doi.org/10.1007/978-3-658-29297-1
Ungar, M. (2021). Performance Marketing: Fundamentals and Strategies for Digital Marketing Practice. Springer Gabler. https://doi.org/10.1007/978-3-658-34610-0

Furthermore – articles on the above topics online and in print: Adzine, Website Boosting, Marketing Börse, Onlinemarketing.de, OMR (Online Marketing Rockstars), t3n, Sistrix Blog, BASIC thinking etc.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6150170
Shop Systems and Fulfillment

Module profile

Exam number
6150170

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tristan Wimmer

Lecturer(s)
Prof. Dr. Rolf Schillinger,
Oliver Dahms,
Prof. Dr. Tristan Wimmer

Applicability	BEC
Semester according to SPO	3. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
As part of this module, students acquire fundamental knowledge and practical skills in the two key areas of e-commerce: shop systems and fulfilment. The module covers both business management and technical perspectives on the selection and operation of shop systems. Students will learn about relevant logistics solutions and how to use them efficiently within an e-commerce environment. They will then apply the knowledge they have gained so far to implement their own business idea.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- Explain the fundamentals of modern e-commerce platforms, identify their key functions and compare different types of systems in terms of technical and economic criteria.
- Identify business requirements for e-commerce shops and incorporate these into the selection and configuration of suitable shop system solutions.
- Independently implement prototypes for e-commerce shops
- Describe the core logistical processes in fulfilment and assess their significance for customer satisfaction and cost-effectiveness in online retail.
- Analyse different fulfilment strategies and service providers in terms of their potential applications, cost-benefit ratios and technical integration.
- To understand technical interfaces and data flows between shop systems and logistics solutions, and to develop simple integration concepts for a seamless process chain in e-commerce.

Literature

- (Deges 2023) Fundamentals of E-commerce: Strategies, Models, Tools
- (Kummer, Grün 2018) Principles of Procurement, Production and Logistics

Module: 6101600,6920140
Software Engineering

Module profile

Exam number
6101600,6920140

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Isabel John

Lecturer(s)
Prof. Dr. Isabel John,
Prof. Dr.-Ing. Anne Heß

Applicability	BEC, BDGD
Semester according to SPO	3. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Basic knowledge of object-oriented programming

Content
The discipline of software engineering forms part of applied computer science and deals with all aspects of software development, from the user's initial idea through to the tested and delivered system

Fundamental concepts
- Objectives and principles of software engineering
- Overview of the types of deliverables from software development phases, with associated methodologies
- Fundamentals of object-oriented functional and data modelling using UML
- Object-oriented analysis based on UML (use-case modelling, creation of static models, creation of dynamic models)

In addition to these core activities, the following related topics are covered:

- Modelling
- Costs and benefits
- Software quality, quality assurance and testing (overview)
- Dynamic and static testing
- Configuration management (basic)
- Fundamentals of data protection, privacy and ethics

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will have acquired the following skills:

- Students understand the specific characteristics of software that distinguish it from other products.
- Students recall the principles of software engineering and understand how to apply them.
- Students analyse requirements during client meetings in order to record, model and specify them in a structured manner.
- Students apply UML diagram types (e.g. use-case diagrams, class diagrams, activity diagrams, sequence diagrams) to model requirements.
- Students use UML diagrams to create designs.
- Students assess the role of quality assurance in the software development process and explain the relevant objectives and skills.
- Students understand the principles of analytical quality assurance and create test cases for various black-box and white-box testing methods.
- Students recall fundamental data protection regulations and evaluate their application in software projects with regard to data protection and digital sovereignty.

Literature
- Ludewig, J. and Lichter, H.: Software Engineering – Fundamentals, People, Processes, Techniques, 4th edition, 2023
- Sommerville, Ian: Software Engineering. Pearson, 2018
- Oestereich, Bernd: Analysis and Design with UML 2.5 / UML 2.5.1; Oldenbourg; Munich, 2013/2020
- McLaughlin: Object-Oriented Analysis and Design from Head to Toe, O'Reilly, 2017
- Kecher, Christoph; Hoffmann-Elbern, Ralf; Will, Torsten T.: UML 2.5: The Comprehensive Handbook, Rheinwerk Computing, 2021
- Spillner, A., & Linz, T.: Fundamentals of Software Testing: Training and Further Education to Become a Certified Tester – Foundation Level according to the ISTQB® Standard. dpunkt.verlag, 7th edition. 2024

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003031
Software industry, education and economy in India

Module profile

Exam number
5003031

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Frank Deinzer

Lecturer(s)
Prof. Dr. Arndt Balzer,
Prof. Dr. Frank Deinzer

Applicability	BDGD, BEC, BIN, BISD, BWI
Semester according to SPO	3. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
A good command of English

Recommended prerequisites for the participation in the module
none

Content
FWPM is organising a field trip to Bangalore, India, in the second half of February 2027; participants must cover their own flight costs. Further information is available on the course.

Introduction to India and our partner university, Christ University in Bangalore
Selection of topics for the intercultural presentations (e.g. politics, religion, the IT industry) in preparation for the field trip.
Presentation of methods for developing presentations with regard to topic selection, structure and slide design.
Introduction to the topic for the joint projects with students from Christ University, which will be worked on in small groups from October onwards.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
none

Learning outcomes
Students recall key facts about India and its significance in the field of information technology.
Students analyse and evaluate differences between Germany and India.
Students use a visually-oriented, free-flowing presentation style during their presentations.
Students apply basic intercultural communication techniques, using India as an example.
Students demonstrate successful collaboration with students from the partner university as part of a technical project.

Literature
This will be announced during the seminar, depending on the topics covered.

Module: 6810150,6102600
Business and IT Law

Module profile

Exam number
6810150,6102600

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Oliver Ehret

Lecturer(s)
Prof. Dr. Oliver Ehret

Applicability	BISD, BEC
Semester according to SPO	3. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
General Contract Law
Specific Contract Law relating to IT, specific types of contract; fundamentals of copyright law
Overview of relevant areas of industrial property law; law on the internet
Data protection law

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
To provide an understanding of the law, the fundamental legal concepts of our legal system and its basic structures; to give an overview of the role the law plays for computer scientists. Understanding the key principles of general private and public law; understanding and classifying terms relating to IT law; gaining an overview of the key areas of law and contractual aspects relevant to IT; Identifying, assessing and mitigating legal risks; developing practical skills in dealing with IT-related legal issues and becoming familiar with basic types of contracts in the IT sector; acquiring an understanding of the fundamentals of copyright law, particularly in relation to software and databases; understanding the principles of data protection, particularly in the IT sector.
The importance of data protection law, particularly in an international context, is highlighted. In this regard, emphasis is also placed on conveying how closely computer science, the architecture of IT systems, information security and data protection are interlinked.

Literature
Köhler, Civil Code, dtv, 89th edition, 2022
Schneider: IT and Computer Law, 15th edition, Beck dtv, Munich, 2022.
Kallwass, Abels: Private Law, Franz Vahlen Publishers, Munich, 24th edition, 2021
Hoeren: IT Contract Law, 2nd edition, Otto Schmidt Publishers, Cologne, 2012.
Marly: Practical Handbook on Software Law, 7th edition, C.H. Beck, Munich 2018.
Härting: Internet Law, 7th edition, Otto Schmidt Publishers, Cologne 2022.
Hoeren: Lecture Notes on Internet Law, University of Münster, as at April 2020
Haug: Fundamentals of Internet Law, W. Kohlhammer, 3rd edition, 2016
Redeker: IT Law, C.H. Beck, 7th edition, 2020
Schneider: Handbook: IT Law, Otto Schmidt, 5th edition, 2017
Kühling, Sack, Hartmann: Data Protection Law, 5th edition, C.F. Müller, 2021

4. semester

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6102110
Content Engineering

Module profile

Exam number
6102110

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele, Nils Stotz

Applicability	BEC
Semester according to SPO	4. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Knowledge of website development and UX

Content
The Content Engineering module combines strategic content planning with technical implementation skills and data-driven optimisation. It enables students not only to create digital content, but also to model it as structured data and to demonstrate its effectiveness empirically. Building on the content lifecycle, the module explores methods of information retrieval and semantic analysis in depth. A central focus is on content modelling for multi-channel architectures and the application of structured data (e.g. Schema.org) to maximise discoverability.
A key focus is the validation of content strategies through web analytics, A/B testing and experimentation. Students learn to formulate hypotheses regarding user guidance, set up experiments in a statistically sound manner and interpret results using web analytics tools. The module also addresses the establishment of a ‘culture of experimentation’ within organisations, with a view to transforming decision-making processes from subjective opinions to data-driven facts.
The module is rounded off by the design of accessible content and the considered use of generative AI tools. The aim is to understand content as a measurable product that is managed technically and continuously optimised through testing.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students …

- understand the technical principles of information retrieval and semantic analysis in order to comprehend how search engines index content.
- create media-neutral content models and taxonomies to structure content in a scalable manner for complex multi-channel architectures.
- apply standards for structured data (e.g. Schema.org) to ensure the machine-readability and technical SEO performance of web content.
- Create hypothesis-driven A/B testing scenarios to empirically assess the effectiveness of content variants.
- Analyse user behaviour and test results using web analytics tools to derive data-driven recommendations for content optimisation.
- Create digital content in strict compliance with digital accessibility guidelines to ensure accessibility for all user groups.
- Critically assess the organisational prerequisites for a successful culture of experimentation and the use of AI tools in order to establish sustainable processes within organisations.

Literature
Aubele, T.; Girke, D.: Accessible Websites, Rheinwerk Verlag, 2025
Erlhofer, S.: Search Engine Optimisation: The Comprehensive Handbook, Rheinwerk Verlag, 2023
Hassler, M.: Digital Analytics with Google Analytics 4 and Co.: Analysing Metrics, Understanding Visitors, Using Google Analytics, mitp Business, 2023
Kohavi, R.: Trustworthy Online Controlled Experiments: A Practical Guide to A/B Testing, Cambridge University Press, 2020
Löffler, M.: Think Content!: Content Strategy, Content Marketing, Writing for the Web, Rheinwerk Verlag, 2014
Manning, C.; Raghavan, P.; Schütze, H.: Introduction to Information Retrieval, Cambridge University Press, 2008
Rorig, D.: The Art of Writing, Rheinwerk Verlag, 2020

Module: 6101710
Senior Seminar

Module profile

Exam number
6101710

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 50 hrs

Self-study: 100 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Mario Fischer

Lecturer(s)
Prof. Dr. Mario Fischer,
Prof. Dr. Christina Völkl-Wolf,
Prof. Dr. Rolf Schillinger

Applicability	BEC
Semester according to SPO	4. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
To develop an understanding of current requirements, solutions, tools and trends in e-commerce.
The ability to analyse, develop and evaluate a specific, complex topic in a problem-oriented manner; to prepare and deliver a presentation; to produce a written report; and to discuss and defend the content before the whole class.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Presentation, Colloquium

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
To acquire the ability to analyse and evaluate complex specialist topics in the broadest sense, and to compile the findings into a comprehensible presentation and documentation of the results obtained.
Students present and document their findings in the seminar.

Ability to independently expand existing knowledge:
Students learn to familiarise themselves independently with new material, to understand it and, where appropriate, to apply it, and to deepen and/or expand their knowledge on their own initiative.

Competence in identifying significant technical developments:
Through in-depth discussions of the topics presented and their joint contextualisation within a broader disciplinary framework, participants learn to differentiate between and assess the potential that new technologies, methodologies or tools hold for their future field of work. In particular, this involves taking a critical look at data, surveys, statistics, etc., and jointly assessing whether these meet the standards of scientific rigour.

The seminar topics each cover current and forward-looking technologies and methods and are reassigned for each session.

Literature
Issued on a case-by-case basis, depending on the seminar topic

Module: 6100830
English Communication

Module profile

Exam number
6100830

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Graeme Dunphy

Lecturer(s)
Prof. Dr. Graeme Dunphy

Applicability	BEC
Semester according to SPO	4. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Networking and small talk;
Presentations;
Telephone calls;
Discussions and meetings;
Negotiations;
Projects

This seminar is at level B2 of the CEFR.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
This course focuses primarily on developing oral language skills in relation to topics and situations relevant to the workplace.

Literature
To be announced during the event

Module: 6101510,6910200
IT Project Management

Module profile

Exam number
6101510,6910200

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr.-Ing. Anne Heß

Lecturer(s)
Prof. Dr. Eva Wedlich,
Prof. Dr.-Ing. Anne Heß

Applicability	BEC, BDGD
Semester according to SPO	4. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
- Introduction to projects and project management
- Project organisation
- Project planning process
- Project costing
- Project control and monitoring
- Project closure
- Human resources management and project marketing
- IT product management
- Core activities in IT projects (analysis, design, implementation, integration and stabilisation)
- Quality management and quality assurance
- Configuration management (basic)
- Process models (phase-based models vs. iterative / incremental / agile process models)
- Agile project management / Scrum

E-commerce degree programme: In the non-dual degree programme, the lecturer determines the topics for the practical examples used in seminar-based teaching and examinations. In the dual degree programme, students can work on practical examples from the company in seminar-based teaching and examinations.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
None

Learning outcomes

- Students acquire project management skills, in particular the knowledge required of project managers. To this end, the course covers project management methods, processes and tools.
- Students are familiar with the relevant core activities of software development and their objectives
- Students can identify and describe sub-activities, prerequisites and output types relevant to the core activities
- Students can describe various process models (waterfall model, V-model, Scrum), including their respective advantages and disadvantages, and can describe and map activities within these process models
- Students understand the characteristic features and differences between phase-oriented process models and iterative/incremental process models, and can select suitable process models for a given project context and justify their choice
- Students are familiar with the fundamental principles, roles, artefacts, ceremonies and practices of agile projects (using Scrum as an example) and can find their feet as a team member in an agile project
- Students understand the importance and relevance of software quality * Students are familiar with key concepts of quality management and quality assurance and can describe the relevant tasks and skills (soft skills) of quality officers
- Students are familiar with the key objectives, concepts and activities of configuration management, including the basic functionalities of tools designed to support configuration management

Literature

- Johannsen, A. and Kramer, A.: Essential Knowledge for Software Project Managers, dpunkt.verlag, 2017.
- Olfert, K.: Project Management, NWB Verlag, 11th edition, 2019.
- Sterrer, C. and Winkler, G.: Setting Milestones: Project Management (Methods, Processes, Tools), Goldegg Verlag, 2010.
- Sterrer, C.: pm k.i.s.s.: Keep it short and simple, Goldegg Verlag, 2011. * Tiemeyer, E: Handbook of IT Project Management, Hanser, 2018
- Ziegler, Michael: Agile Project Management with Scrum for Beginners, ISBN-13: 979-8751100346, 2021
- Gundlach, Marco: Agile Project Management – Navigating Successfully with Scrum and Kanban: A Comprehensive Guide for Beginners and Experts, ISBN-13: 979-8392911936, 2023

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Module: 6100930,6810190 Innovation Management and Entrepreneurship

Module profile

Exam number
6100930,6810190

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Michael Müßig

Lecturer(s)
Prof. Dr. Michael Müßig

Applicability	BEC, BISD
Semester according to SPO	4. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Introduction: Motivation, innovation, business, business start-ups, start-ups and a look at economic history
Definitions: Management, … and all terms relating to innovation and types of innovation
Processes and interrelationships: Adoption and diffusion, acceptance
Forecasting: Gartner's Hype Cycle and the Three Horizons
Innovation within organisations, Schumpeter and The Innovator's Dilemma, disruption
Start-up ecosystems
End-to-end: Design thinking, personas and value proposition, Business Model Canvas, Lean Start-up and customer development, MVP and prototyping
The business plan, the founding team
Growth and change, growth hacking
Setting up, financing, structuring and valuing a business
Open and Crowd Innovation, Jugaad, Frugal Innovation and Sustainability in Start-ups and Innovation

Case Studies (rotating): Tesla, Kodak and digital photography, Fashion and TEC, Scoutbee, Vogel Communications

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will be able to:

- Describe and explain the terminology relating to innovation management, as well as business start-ups and management
- Evaluate statements regarding regional and internal corporate ecosystems for innovation, as well as intrapreneurship and entrepreneurship
- To understand the importance of teams and team processes in the field of innovation development and business start-ups, and to be able to apply team-building methods
- Students will learn the fundamentals of a business plan in terms of its structure and development, and will be able to develop and draw up one independently
- Identify the key tax, legal and economic components of a successful business start-up and analyse their significance
- Using methodological approaches to design thinking, value proposition and business models, students will be able to present and design their own business model ideas

Literature
Compulsory reading:
Hess, Thomas: Strategically Managing Digital Transformation. Springer Fachmedien Wiesbaden GmbH, 2019
Osterwalder, Alexander; Pigneur, Yves et al.: *Business Model Generation*, campus Verlag, 2013 (and later editions)
Ries, Eric: *The Lean Startup*, 4th ed., Reline-Verlag, Munich, 2015
Kotsemir, M.; Abroskin, A.; Meissner, D.: Innovation Concepts and Typology – an evolutionary
Discussion. Basic Research Programme, Working Papers, SERIES: SCIENCE, TECHNOLOGY AND INNOVATION WP BRP 05/STI/2013

Supplementary reading:
Christensen, Clayton M.: The Innovator’s Dilemma, Harvard Business Review Press (1997 and current editions, also available in German)
Burkhardt, Christoph: Denkfehler Innovation; SpringerGabler 2017

Module: 6101400
Web Application and Development Systems

Module profile

Exam number
6101400

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Dr. Rolf Schillinger

Applicability	BEC
Semester according to SPO	4. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
WebProg I–III
Databases
Introduction to Web Technologies

Content
- MVC architectures
- ‘Convention over configuration’ and ‘Don’t repeat yourself’ paradigms
- Object-relational mapping
- Modern web development toolchain (Composer, npm, Grunt, etc.)
- Implementation of models, views and controllers; the Active Record pattern; the asset chain; dependency injection in Laravel or Flask
- JavaScript frameworks and their integration with an API

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will be able to:

- Describe MVC architectures and recognise and classify their variants and modifications
- To be familiar with different approaches to object-relational mapping
- To use modern toolchains
- To analyse and structure project requirements
- To plan and implement websites using MVC frameworks such as Laravel and JavaScript frameworks such as Vue.js

Literature
To be announced during the event.

5. semester

Module: 6102410
Supervised Internship

Module profile

Exam number
6102410

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
1

ECTS-Credits (CP)
25.0

Workload
Guided study time:
Presence time: 15 hrs

Self-study: 735 hrs

Total: 750 hrs

Teaching format
Practice

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Tristan Wimmer

Lecturer(s)
Prof. Dr. Tristan Wimmer

Applicability	BEC
Semester according to SPO	5. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
> 90 ECTS credits. 55 ECTS from the first year of study

Recommended prerequisites for the participation in the module
none

Content
- As part of a larger e-commerce project, the intern must work independently in as many areas as possible. This project is expected to last at least 12 weeks.
- Ideally, the intern should familiarise themselves with various departments and areas of the company prior to the project in order to gain a general understanding of other departments and the company as a whole.

The contact person/supervisor at THWS is the representative responsible for the supervised practical phase, Prof. Dr Tristan Wimmer

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Documentation, Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
The intern should

- acquire relevant, practical knowledge of business processes
- (through guidance) learn to work independently and on their own initiative on e-commerce projects.
- to link the skills acquired during their studies with practical experience
- to learn to understand problems and requirements (e.g. customer requests)
- to learn to design and implement solutions (e.g. for business processes and/or IT projects)
- Experience working as part of a team.
- Learn about and experience how the company, its processes and organisational procedures work.
- Learn about and experience the professional field of computer science.
- Learn to approach the right people when problems arise.
- See the unwavering commitment to the successful and professional implementation of projects demonstrated in practice.
- Experience excellence and professionalism.
- See how staff are inspired and engaged.
- Recognise and feel the purpose of their work.

Literature
It is not possible to provide a general recommendation for reading material

Module: 5002350,6101110
Soft and Professional Skills

Module profile

Exam number
5002350,6101110

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
6

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Prof. Dr. Gabriele Saueressig,
Prof. Dr. Christina Völkl-Wolf,
Aylin Heilsberg,
Katja Hollerbach,
Kerstin Betzel,
Julia Holleber,
Christian Genheimer

Applicability	BEC, BWI
Semester according to SPO	5. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
The module provides fundamental theoretical and practical knowledge of key soft and professional skills. Through one-day workshops and seminars, students are introduced to facilitation techniques using the Metaplan method, negotiation techniques based on the Harvard method, the basics of body language, team management, conflict management and the fundamentals of academic work.
In addition to imparting knowledge, the focus is on practical application: in practical exercises, role-plays and group work, students take on specific tasks and test the effectiveness of various methods. In addition, academic working methods such as formulating research questions, conducting literature reviews, citing sources correctly and producing structured, well-argued academic papers are covered.

Fundamentals of soft and professional skills, in particular
o the importance and areas of application of soft and professional skills in academic studies and professional life,
o methodical and reflective action in a professional context.

Facilitation and communication techniques, in particular
o the fundamentals of facilitation,
o facilitation techniques based on the Metaplan method,
o structuring and visualising group processes.

Negotiation techniques, in particular
o the fundamentals of negotiation,
o negotiation techniques based on the Harvard method,
o interest- and solution-oriented communication.

Fundamentals of body language, in particular
o facial expressions, gestures and posture,
o the impact of demeanour and outward appearance,
o the conscious use of non-verbal communication.

Team and conflict management, in particular
o Stages of team development,
o Basic methods of team management,
o Causes and forms of conflict,

o Simple communication and problem-solving strategies in conflict situations.

Fundamentals of academic writing, in particular
o Developing simple academic research questions,
o Fundamentals of literature review,
o Citation rules and avoiding plagiarism,
o Organisation and structure of short academic papers.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- apply facilitation techniques (in particular Metaplan) and negotiation techniques based on the Harvard Method,
- to understand the basics of body language (facial expressions, gestures, posture, appearance) and to use them consciously,
- to design team-building processes and apply team management methods,
- to analyse conflicts within groups and address them using appropriate communication and problem-solving strategies,
- to recognise and reflect on the importance of methodologically sound practice when applying soft and professional skills,
- to develop academic research questions, research suitable sources, cite them correctly and independently produce a short academic paper.

Literature
Foppa, K.: Communication. An Introduction to Language and Dialogue. Munich, latest edition.
Schulz von Thun, F.: Talking to One Another (Vol. 1–3), Reinbek, latest edition.
Fisher, R.; Ury, W.; Patton, B.: The Harvard Concept. The Classic Guide to Negotiation Techniques. Frankfurt am Main, latest edition.
Theisen, M. R.: Academic Writing. Technique – Methodology – Form. Munich, latest edition.
Further up-to-date materials and practical examples will be provided in the workshops and seminars.

6. semester

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003859
Agentic AI: Enabling Autonomous and Goal-Driven Intelligence

Module profile

Exam number
5003859

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Frank-Michael Schleif

Lecturer(s)
Dr. Manikandakumar Muthusamy

Applicability	BIN, BWI, BEC, BISD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Python programming, Fundamentals of AI/ML.

Content
This course is designed to introduce students to next-generation AI systems capable of autonomous decision-making, planning, reasoning and self-improvement. Unlike traditional reactive AI models, agentic AI systems can initiate actions, perform multi-step tasks, collaborate with other agents and adapt to dynamic environments. This course equips learners with both the theoretical foundations and hands-on experience required to build autonomous AI agents.
Learners will explore agent architectures, cognitive models, memory systems, tool-use capabilities, multi-agent collaboration frameworks, and practical agent deployment workflows. Through laboratory exercises using modern frameworks such as Flowise, LangChain, AutoGen Studio, CrewAI and AgentOps, students will build goal-driven agents, evaluators, planners and multi-agent systems. Real-world applications from business automation, sustainability, smart systems and software engineering will be emphasised throughout.
The course concludes with a practical assessment in which participants design, implement and demonstrate a functional autonomous agent. By integrating theory, hands-on experimentation and evaluation, this course provides a strong foundation for applying Agentic AI in academic, industrial and research environments aligned with the green digital transformation.

1. Foundations of Agentic AI
Agentic AI – Autonomous AI vs Traditional AI – Agent lifecycle and capabilities – Types of autonomy in AI systems – Rule-based agents vs LLM-driven agents – Real-world examples of agents – Maturity levels of autonomous systems – Application domains aligned with sustainability and the green digital transition.
Interactive brainstorming: Where can agents be used in business?
2. Agent Architectures, Memory, and Planning
Cognitive architecture: perception, reasoning, memory, action – Memory systems in agents: short-term memory, episodic memory, vector-store memory, long-term memory - Planning systems: task decomposition, tree of thought, planner-executor architecture – Tool invocation & API integration – Evaluator-planner loops – Safety layers & guardrails.
3. Building Autonomous Agents and Tool-using Systems

Agent capabilities: tool use, retrieval augmentation, action loops – Safety, guardrails, and constraints; Using frameworks: LangChain Agents, AutoGen Studio, CrewAI worker-manager roles – Hands-on use cases: research automation agents – business workflow agents.

4. Multi-agent Systems, Collaborations, and Workflows

Multi-agent systems: roles and communication, manager-worker architecture, planner-agent-reviewer loops, collaboration strategies: parallel, sequential, cooperative, real-world MAS applications (smart grids, supply chain, robotics)

5. Deployment, Monitoring, Ethics

Deployment workflows (local, cloud) – Logging, monitoring, and evaluation of agents – Safety, ethical issues & governance of autonomous systems – Responsible AI principles for autonomous systems – Real-world challenges: hallucination, error handling, misuse.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Practical study achievement

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
1. Understand and explain the principles, architecture and lifecycle of agentic AI systems, and compare them with traditional AI models.
2. Design and implement autonomous agents using modern frameworks with capabilities such as planning, memory, tool use and reasoning.
3. Evaluate and deploy single-agent and multi-agent systems for real-world applications relating to sustainability, automation and intelligent digital ecosystems.

Literature
Textbooks:
Martin Ford, *Architects of Intelligence: The Truth About AI from the People Building It*, 2018.
Stuart J. Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, Prentice Hall Series in Artificial Intelligence, 2009
Reference Books:
Kence Anderson, “Designing Autonomous AI: A Guide for Machine Teaching”, O’Reilly Media, Inc., 2022

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6322190
Augmented Reality

Module profile

Exam number
6322190

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Stefan Sauer

Lecturer(s)
Stefan Sauer

Applicability	BEC, BIN, BWI, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This event is organised by the Faculty of Plastics Technology and Surveying (FKV):
(https://geo.thws.de/studium/bachelor-geovisualisierung/studienablauf/modulhandbuch-bgv-ab-ws-202223/)

For the schedule, see: https://geo.thws.de/studium/aktuelle-lehrveranstaltungsplaene/

Augmented and Mixed Reality and their applications
- Implementation of marker-based applications
- Implementation of image-based applications
- Implementation of LBS applications

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
1. Students are familiar with the fundamental concepts of augmented reality (AR) and mixed reality (MR), as well as their areas of application.
2. Students understand the differences between marker-based, image-based and location-based services (LBS) in AR technology.
3. Students apply relevant services to plan and implement AR applications.
4. Students analyse requirements and potential applications for AR applications in relation to various content-based approaches.
5. Students evaluate the effectiveness of different techniques for visualising content in relation to spatial objects and markers.
6. Students independently create AR applications that are both marker-based and image-based, and are able to publish them successfully.
7. Students understand concepts for integrating AR applications into existing systems and services.

Literature
Dörner, R.; Broll, W.; Grimm, P.; Jung, B.: Virtual and Augmented Reality (VR/AR): Fundamentals and Methods of Virtual and Augmented Reality. 2nd edition, Springer-Verlag Berlin, Heidelberg, 2019. ISBN 978-3-662-58860-4.
Vetter, M. & Olberding, H.: E-learning material on geovisualisation, [online] smart.vhb.org, 2019/2020.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003836
BSI BCM Practitioner and BSI Incident Practitioner

Module profile

Exam number
5003836

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Alexander Schinner

Lecturer(s)
Liane Kiesewalter,
Tobias Kasch

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
BCM Practitioners
- Introduction to BCM
- BCM process and stage-based model
- Standards and regulatory framework
- Initiation, planning and implementation
- Establishing and empowering the BAO
- BIA pre-screening and BIA
- Risk analysis
- Contingency planning (BC strategies, GFPs and WAPs)
- Drills and testing
- Performance review and key performance indicators

Incident Practitioners
- Introduction to the cyber security network, including the framework for digital first responders, incident practitioners and incident experts
- Summary of the content of the basic course
- Conduct on the telephone, including non-technical measures
- Threats and types of attack, and an overview of the current threat landscape
- Standard operating procedures
- Handling IT security incidents
- Remote support
- Incident handling for IT systems ‘outside the usual office environment’
- ‘After the incident is before the incident’ – preventive measures

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes

- Teaching the BCMS process in accordance with BSI Standard 200-4, with a practical focus
- Effective detection, analysis and management of security incidents in accordance with BSI standards
- Preparation for the relevant BSI audits within the framework of the Cybersecurity Network (CSN)

Literature
https://www.bsi.bund.de/DE/Topics/Companies-and-Organisations/Standards-and-Certification/IT-Basic-Protection/Certified-Information-Security/BCM-Practitioner-Training-Courses/BCM-Practitioner-Training-Courses_node.html
https://www.bsi.bund.de/DE/Themen/Unternehmen-und-Organisationen/Informationen-und-Empfehlungen/Cyber-Sicherheitsnetzwerk/Qualifizierung/Vorfall_Praktiker/Vorfall_Praktiker.html

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003816
Behavioural Pricing

Module profile

Exam number
5003816

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Juliane Richter

Applicability	BEC, BWI, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Students will learn about the influence of prices on consumer behaviour from a psychological perspective. In doing so, they will gain an understanding of the intrapersonal processes involved in the perception, evaluation and retention of price information, and will be able to apply the psychological effects of pricing themselves.

Contents:
Fundamentals of pricing management
- Introduction to the price management process
- Basic models of business pricing theory
- Approaches to price determination

Introduction to behavioural pricing
- Behavioural pricing as a sub-field of behavioural economics
- Psychological processes and constructs for processing price information
- Behavioural science theories on price perception, evaluation and memory

Behavioural Pricing in Practice
- Designing price information from the supplier’s perspective
- Price psychology effects and practical examples
- The use of behavioural pricing in various sectors

Opportunities and Limitations of (Behavioural) Pricing
- Empirical pricing research
- Innovative (digital) pricing approaches from practical and theoretical perspectives
- Ethical and legal aspects of (Behavioural) Pricing

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
General learning objectives:
You will be familiar with the methodological and ethical aspects of pricing and will be able to evaluate pricing approaches from both a business management and a behavioural economics perspective

Specific objectives:
1. Students understand the behavioural pricing approach and are familiar with the theoretical foundations of the psychological impact of price information.
a. Subject-specific competence: Students are familiar with the fundamentals of behavioural pricing management. They understand the psychological impact of price information at different stages of the purchasing process.
b. Problem-solving and evaluation skills: Students understand the approach of behavioural pricing as a sub-discipline of behavioural economics and how it differs from classical price theory.
c. Methodological competence: Students practise interpreting behavioural science and psychological models and applying them to price management.
d. Communication competence: Students are able to discuss the concepts and models presented in the lecture precisely and using correct technical terminology.
e. Personal competence: Students are able to deepen their knowledge independently by consulting specialist articles.

2. Students are able to apply price psychology effects themselves and are familiar with various areas of application.
a. Subject-specific competence: Students understand the influence of different pricing parameters on price perception and consumer behaviour.
b. Problem-solving and evaluation skills: Students are able to evaluate price psychology measures in different contexts and explain them on the basis of the relevant theory. They can independently derive suitable price psychology measures and apply them to specific real-world cases.
c. Methodological competence: Students are able to apply the effects discussed in the lecture to practical, price-related issues.
d. Communication competence: Students can contribute to discussions on price psychology measures and present their own approaches. In doing so, they communicate precisely, effectively and using correct technical terminology.
e. Social competence: As part of a practical case study, students work effectively as part of a team.
f. Personal competence: Students work independently and creatively, and utilise feedback for their personal development.

3. Students are familiar with the business fundamentals of pricing policy.
a. Subject-specific competence: Students understand the significance and decision-making areas of pricing policy. They are familiar with the classical concepts of pricing theory and the approaches to price determination.

b. Problem-solving and evaluation skills: Students are able to correctly contextualise the concepts and approaches of pricing management and apply them to case studies.
c. Methodological skills: Students are familiar with empirical methods for price determination, understand the challenges involved and are able to apply selected survey methods themselves.
d. Personal competence: Students are able to expand on the fundamental concepts covered through independent study of the literature.

4. Students critically examine current trends in pricing management as well as innovative, digital pricing approaches.

Literature

Beck, H. (2014). Behavioural Economics – An Introduction (focusing on Chapters 1, 4–6). Wiesbaden: Springer Gabler.
Diller, H., Müller, S., Ivens, B., & Beinert, M. (2021). Pricing: Principles and Processes of Corporate Pricing Policy. Stuttgart: Kohlhammer.
Holzwarth et al. (2020). Applying behavioural science to health and financial decisions. In: Behavioural Economics Guide 2020.
Kopetzky, M. (2015). Price Psychology: Four Steps to Optimised Pricing. Wiesbaden: Springer Gabler.
Krämer, A. (2020). Dynamic and Individual Prices from a Business and Consumer Perspective. In R. Kalka & A. Krämer (Eds.), Price Communication. Wiesbaden: Springer Gabler.
Mazumdar, T., Raj, S. P., & Sinha, I. (2005). Reference price research: Review and propositions. Journal of Marketing, 69(4), 84–102.
Meehan, B., Rosenberg, S., & Duke, C. (2018). How to double savings rates: A case study for nudging for good. In: Behavioural Economics Guide 2018.
Pechtl, H. (2014). Pricing Policy: Behavioural Pricing and Pricing Systems. Konstanz: UVK Verlagsgesellschaft mbH.
Pechtl, H. (2004). Consumers' price knowledge: a theoretical and conceptual analysis (No. 01/2004). Economic Discussion Papers.
Simon, H. (2015). Confessions of the pricing man. Wiesbaden: Springer Gabler.
Simon, H. & Fassnacht, M. (2016). Price management: Strategy – Analysis – Decision-making – Implementation. Wiesbaden: Springer Gabler.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003856
CANVA – Branding with AI

Module profile

Exam number
5003856

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Verena Rempel

Applicability	BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Your own laptop, installation of the Pro version or trial access to the CANVA programme.

Content
1. Corporate Identity – Strategic
Understanding key terms
CI, CD, brand
Best-practice examples from various sectors, analysis of international brands
Positioning, brand values
Mission & vision
Identity models (e.g. Golden Circle)
Target audience profile (e.g. persona)
Brand personality (mood board, archetype)
Tone of voice and writing style

2. Corporate Design – Visual
Deriving a design system
From brand essence to visual system (designing with Canva)
Logo
Colour palette
Typography
Visual language
Layout principles (grid, white space, composition)

3. Brand development
Creating social media content for the brand
Colour management and the impact of colour
Fonts and type design
Photo editing, graphics
Video, Reels, Stories

Developing a brand ecosystem:
Creating digital and print media such as websites, social media content, audiovisual content, business cards, etc.

Use cases / Application:
Self-employment/freelancing: A consistent corporate design helps to project a professional image and set you apart.
Portfolio: Having your own branding as a ‘common thread’ creates recognition and demonstrates strategic thinking.

Start-ups & student initiatives: A clear brand identity simplifies communication, fundraising and community building.
Agency work: CI/CD expertise is a key qualification for strategic design processes carried out on behalf of clients.
Research & science: Scientific projects also benefit from a coherent, understandable identity.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Students will develop a comprehensive corporate identity and corporate design
concept for a real-world project of their own or a fictional project/ start-up, including visual implementation using Canva and AI applications.
The aim is to design a consistent, professional brand image for future real-world application. Proficiency in using Canva as a design software is required.

Students review key concepts of corporate identity and corporate design.
Students understand the importance of strategic brand management for digital communication media.
Students analyse CI/CD systems in terms of target audiences, differentiation and media usage.
Students evaluate design solutions in the context of user experience, media formats and communication objectives.
Students apply the knowledge they have acquired and create a complete corporate identity concept, including a cross-media design system, for their own or a fictional project.

Literature
https://www.canva.com/de_de/

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003861
Computer Networks for Practical Engineers

Module profile

Exam number
5003861

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Bishnu Prasad Gautam

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This course provides students with practical knowledge and skills in computer networks, focusing on how networks are constructed, configured and operated by computer network engineers. The course begins at the physical layer with hands-on construction of LAN (Ethernet) cables, and then introduces fundamental concepts such as classful and classless IP addressing, switching and routing.
Students will learn static routing as a foundation, followed by dynamic routing protocols including RIP, OSPF and BGP through practical laboratory exercises. The course also introduces essential network security concepts, with particular attention to firewalls and basic network protection mechanisms required in real-world network environments.
In the final part of the course, students are introduced to next-generation networking paradigms, such as the Internet of Things (IoT), Software-Defined Networking (SDN) and quantum networks, providing insight into the future evolution of networks. As well as providing a broad foundation in computer networking for careers in IT and engineering, this course also supports self-study for the 200-301 Cisco Certified Network Associate (CCNA) exam by developing the relevant conceptual understanding and practical skills.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes

- Students understand the fundamentals of computer networking, including LAN construction, network components, and basic communication principles used in modern information systems.
- Students apply IP addressing, VLAN configuration and routing concepts to design and configure small- to medium-scale networks using both static and dynamic routing methods.
- Students analyse and compare dynamic routing protocols such as RIP, OSPF and BGP, and explain their operational principles, use cases and performance characteristics.
- Students design and implement practical network topologies by integrating routers, switches and end devices, and verify connectivity through hands-on configuration and testing.
- Students gain an understanding of emerging and future network systems, including the Internet of Things (IoT), Software-Defined Networking (SDN) and quantum networks, and evaluate their potential impact on security, scalability and next-generation communication infrastructures.

Literature
Will be provided at the start of the module.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003862
Data Analytics

Module profile

Exam number
5003862

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Dr. Jaani Väisänen

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
No coding required. Please install Altair AI Studio before the course; a university student licence is available via https://web.altair.com/altair-student-edition.

Content
This course provides business students with a practical, no-coding introduction to data analytics using Altair AI Studio. You'll learn to build an end-to-end analytics workflow—from importing and preparing data to selecting variables, building models, evaluating performance, and interpreting results to inform business decisions.

- Course introduction, AI Studio workflow basics, and practical data preparation for modelling
- Regression

o Concept: what regression explains
o Hands-on workflow: build a regression model in AI Studio
o Validation and model quality: simple train/validation/test set incorporating key fit metrics

- Clustering

o Concept: grouping similar cases
o Hands-on workflow: prepare data and create clusters in AI Studio
o Validation and model performance: choosing a useful number of clusters for the business question

- Tree models

o Concept: classification and interpretable drivers
o Hands-on workflow: build and interpret a decision tree in AI Studio
o Validation and model quality: cross-validation and practical classification metrics

- Association analysis:

o Concept: co-occurrence and recommendations
o Hands-on workflow: create association rule sets in AI Studio
o Validation and model quality: support, confidence and lift

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of this course, students will be able to:
1. Construct end-to-end analytics workflows (Apply/Create): Independently design and execute complete data mining processes within Altair AI Studio—from data import and cleansing to model generation—without relying on programming code.
2. Analyse and select appropriate methodologies (Analyse): Diagnose specific business problems to determine the most suitable analytical technique (regression, clustering, decision trees or association analysis) based on the structure of the data and the desired business outcome.
3. Evaluate Model Performance and Robustness (Evaluate): Critically assess the quality of analytical models by interpreting quantitative validation metrics (such as R^2, lift, confidence and cross-validation scores) to distinguish between statistical noise and reliable patterns.
4. Synthesise Data into Business Strategy (Create): Translate technical model outputs into actionable business insights and formulate data-driven strategic recommendations for management.

Literature
will be specified during the lecture.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003135
Design Thinking & Innovation

Module profile

Exam number
5003135

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Michael Müßig

Lecturer(s)
Lisa Straub

Applicability	BEC, BIN, BWI, BDGD, BISD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
- An interest in creative yet challenging approaches to problem-solving
- Entrepreneurial thinking
- A willingness to rigorously scrutinise one's own ideas

Content
This course explains the fundamentals and background of innovation management, and design thinking in particular, illustrating these with clear examples. Above all, it is important to convey to participants that today's innovation processes place people at the centre and seek to reconcile customer needs with technical feasibility and economic viability. Students are provided with initial tools to enable them to organise and carry out simple Design Thinking innovation processes independently.
They must understand the basic elements underpinning an innovation or Design Thinking process and how these can be skilfully navigated through exercises. This provides a practical illustration of the differences between this approach and the traditional development process, as well as the advantages offered by a customer-centred approach and the disadvantages associated with the Design Thinking (DT) approach.
The course is divided into two main modules:
1. A brief introduction to innovation management
Participants gain an insight into common innovation models and processes, as well as the background and basic concepts of innovation research.
2. Learning and applying Design Thinking
Design Thinking is based on an iterative, customer-centred and playful problem-solving process, which makes it possible to think outside the box in order to realise or strive for ideas that have previously been overlooked, seem impossible, or may appear illogical or unattainable. During this course, participants will go through a Design Thinking process and, in the process, develop their own ideas into a project. The course is therefore designed to be interactive, which is why a high degree of proactive participation is expected. In return, participants can look forward to a course full of creativity, interesting discussions and crazy ideas.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio, Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
1. Students are familiar with the fundamental components of the Design Thinking process and can name them.
2. Students understand the role of Design Thinking in the context of other innovation models and processes and can contextualise it.
3. Students apply methods for effective problem definition to identify relevant challenges in the innovation process.
4. Students analyse the fundamentals of user research within the Design Thinking process and can explain its significance for solution development.
5. Students evaluate assumptions and hypotheses relevant to innovation in order to (de)construct them effectively.
6. Students organise and conduct brainstorming sessions to generate creative ideas.
7. Students develop prototyping processes, describe them conceptually and can explain their practical application.

Literature
Wobser, Gunther (2022): Agile Innovation Management: Overcoming Dilemmas, Mastering Ambidexterity and Achieving Long-Term Success through Innovation. Springer Gabler. 978-3662645147
Hasso Plattner Institute (A): What is Design Thinking. https://hpi-academy.de/en/design- thin- thinking/what-is-design-thinking.html.
Hasso Plattner Institute (B): The Six Steps in the Design Thinking Innovation Process. https://hpi.de/school-of-design-thinking/design-thinking/hintergrund/design-thinking-prozess.html.
IDEO: Design Thinking. https://designthinking.ideo.com/?page_id=1542.
d.School: An Introduction to Design Thinking. PROCESS GUIDE. Institute of Design at Stanford. https://dschool-old.stanford.edu/sandbox/groups/designresources/wiki/36873/attachments/74b3d/ModeGuideBOOTCAMP2010L.pdf.
Brown, Tim (2009): Change by Design. How Design Thinking Transforms Organisations and Inspires Motivation. 1st edition. Harper Business. 978-006176608-4.
Lewrick, Michael; Link, Patrick; Leifer, Larry (2017): The Design Thinking Playbook. Featuring traditional, current and future success factors. Franz Vahlen GmbH. 978-3039097050.
Uebernickel, Falk; Brenner, Walter; Pukall, Britta; Naef, Therese; Schindholzer, Bernhard (2015): Design Thinking. The Handbook. 1st edition. Frankfurter Allgemeine Buch. 978-3956010651.
Wobser, Gunther: Reinventing: What SMEs Can Learn from Silicon Valley. BESHU BOOKS. 978-3982195025

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003852
Digital Sovereignty - Operational Concepts and Technologies

Module profile

Exam number
5003852

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr.-Ing. Tobias Fertig

Lecturer(s)
Prof. Dr. Michael Müßig,
Prof. Dr.-Ing. Tobias Fertig,
Andreas Schütz

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
None

Recommended prerequisites for the participation in the module
None

Content
This module covers the fundamental concepts of digital sovereignty, with a focus on operational and technical implementation.
Following an introduction to key terms (e.g. dependence on platform providers, data sovereignty, vendor lock-in, open source, open standards), specific technical alternatives and tools are examined.

Topics covered include:
- Open-source software vs. proprietary solutions
- Full-stack open source (OS): in e-commerce, IT security, knowledge management, ERPs, etc.
- Digital sovereignty at all levels: from hardware to payment flows (PayPal, Apple Pay, Google Pay vs. the digital euro, GNU Taler, Wero, etc.)
- Cloud alternatives (self-hosting, European cloud providers)
- Open standards and interoperability
- Data protection, encryption and data storage
- Practical examples from public administration, education and business

In the project-based component, students work in teams on specific application scenarios (e.g. the digital infrastructure of a university, an SME or a local authority).
The aim is to design realistic technical concepts for improving digital sovereignty.
At the end of the semester, the results are presented and discussed at a transfer conference attended by the public and a jury.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Practical study achievement

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes

- Students can identify key concepts, stakeholders and motivations relating to digital sovereignty.
- Students can explain how technical dependencies arise through software, cloud services and platforms.
- Students can select suitable open-source and open alternative solutions for specific application scenarios.
- Students can analyse existing digital infrastructures in terms of dependencies, risks and sovereignty deficits.
- Students can compare technical solutions in terms of cost, maintainability, security and sustainability.
- Students can design and present an operational concept for improving digital sovereignty for a defined scenario.

Literature

- https://link.springer.com/book/10.1007/978-3-031-69994-8
- https://direct.mit.edu/books/monograph/3504/The-StackOn-Software-and-Sovereignty
- https://link.springer.com/article/10.1007/s44206-024-00146-7

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003845
Emotional and Persuasive Design in E-Commerce

Module profile

Exam number
5003845

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Petteri Markkanen

Applicability	BIN, BWI, BEC
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This module focuses on the design and development of an e-commerce website over the course of one intensive week, with a primary emphasis on emotional and persuasive design. The module combines theoretical foundations with hands-on, iterative practice, enabling students to apply design principles directly to real-world e-commerce contexts. The work is grounded in user experience design and extends to ethical design in relation to dark patterns, as well as growth hacking as a means of improving and optimising digital commerce solutions.
Throughout the week, students work in teams to design, build and iteratively refine an e-commerce website. All student teams are provided with access to a shared web hosting environment supplied by the course tutor, which is used throughout the week for building and testing the e-commerce sites. Theoretical concepts are continuously applied through practical implementation, user testing and reflection. Applying theoretical concepts in practice, combined with iterative testing and refinement of the students' e-commerce websites, provides valuable insights. This process helps students recognise and understand different user groups, learn how to engage them emotionally, and ethically apply emotional and persuasive strategies in an e-commerce context.

- Introduction to basic operations and UX principles.

Students set up the e-commerce website using WordPress and WooCommerce on the provided web hosting environment, define target groups, and create user personas.

- Emotional Design.

Students design and implement emotional design strategies tailored to their selected target groups and personas.

- Persuasive Design and Ethical Design.

Students conduct user testing, apply persuasive design strategies and develop the next iteration of the website whilst identifying and avoiding dark patterns.

- Growth Hacking for e-commerce.

Students conduct further user testing, finalise the website and develop a plan for growth and optimisation.

- Presentation and Reflection.

Students present their completed websites and key findings, followed by a reflection on the design and development process.
Mornings are dedicated to theoretical sessions, whilst afternoons focus primarily on hands-on activities, such as building e-commerce sites, user testing and interviews.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
Upon completion of the module, students will be able to:

- apply emotional and persuasive design principles in the design of e-commerce websites
- design and evaluate user experiences for different target groups
- recognise ethical challenges in persuasive design in relation to dark patterns
- iteratively improve an e-commerce website based on user testing and feedback
- reflect on the role of emotional and persuasive strategies in digital commerce

Literature
Norman, D. A. (2004) Emotional Design: Why We Love (or Hate) Everyday Things. New York, NY: Basic Books.
Yocco, V. S. (2016) Design for the Mind: Seven Psychological Principles of Persuasive Design. Brooklyn, NY: Manning Publications.
Ellis, S. and Brown, M. (2017) Hacking Growth: How Today's Fastest-Growing Companies Drive Breakout Success. New York: Currency.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003846
Ethical AI Hacking

Module profile

Exam number
5003846

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Benjamin Weggenmann

Lecturer(s)
Paulius Baltrušaitis

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
None

Recommended prerequisites for the participation in the module
Python, ML/AI basics

Content
This course provides a comprehensive understanding of Artificial Intelligence (AI) security,
with a focus on ethical hacking principles, attacks on ML models and data, and defence strategies and techniques.

Students will gain theoretical and practical knowledge of key threats such as evasion, model extraction, model inversion, data extraction, data poisoning and backdoor attacks. They will learn how to simulate attacks for testing purposes, which detection and protection techniques to employ, and how to apply them.

Machine learning models such as Linear Regression, Support Vector Regression, K-Nearest Neighbours, Logistic Regression, Support Vector Machines (SVM) and Decision Trees will be used.

Red and blue team scenarios will be used for practical exercises. Each student will take on a role on both sides. The course will utilise several different scenarios for various attacks and machine learning models.

Here is an example of a scenario for a red and blue team exercise focused on data poisoning and detection:
The company is developing a machine learning model to predict customer churn. The red team aims to reduce the accuracy of the logistic regression model by poisoning the data through label flipping. The blue team's objective is to detect and mitigate the attack.
Red team tasks: Analyse the dataset, develop the poisoning strategy, execute the attack, document the attack. The red team's success is measured by the extent to which they degrade the model's performance.
Blue team tasks: Establish a baseline (train a baseline model and evaluate the model's performance); implement detection mechanisms – using techniques such as outlier detection (e.g. Isolation Forest); mitigate the attack; document the defence. The Blue Team's success is measured by their ability to detect and mitigate the attack and restore the model's performance.
Both teams will be assessed on the clarity and thoroughness of their documentation and the presentation of their findings to the whole

group of students, demonstrating and commenting on their Python code and explaining their strategies.
Tools for coding: Jupyter Notebook environment for Python (scikit-learn, pandas, numpy, matplotlib, seaborn), e.g. Google Colab.

By the end of the course, students will work in teams to formulate responsible AI security testing methodologies that meet ethical and legal standards. They will discuss and evaluate the ethical implications of AI vulnerabilities and develop a set of ethical guidelines for AI security and ethical hacking.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
1. Understand basic AI security concepts, ethical hacking principles, and key machine learning threats.
2. Identify and classify AI-specific attacks, including evasion, model extraction, and data poisoning.
3. Simulate red team (attacker) and blue team (defender) AI security scenarios.
4. Apply ethical hacking techniques to assess and exploit vulnerabilities in AI models.
5. Evaluate AI attack detection and protection strategies to improve security.
6. Investigate AI security breaches and analyse countermeasures.
7. Develop ethical guidelines for responsible AI security testing and vulnerability disclosure.

Literature
To be clarified during lessons

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003837
Introduction to Artificial Intelligence

Module profile

Exam number
5003837

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Andreas Lehrmann

Lecturer(s)
Prof. Dr. Andreas Lehrmann

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Basic knowledge of programming (Python) and mathematics (linear algebra, analysis).

Content
Over the last few years, artificial intelligence (AI) has profoundly changed the way we process information and make decisions, both in our personal and professional lives. A thorough understanding of the principles underlying AI is therefore a critical skill in many industries.

This course serves as a broad introduction to AI and its subfields. We will discuss — starting from the very basics — the design, training and operation of an AI system. Drawing on intuitive concepts and visual insights, we will introduce a technical framework that enables us to express the fundamental building blocks of an intelligently operating system (e.g., an autonomous robot). Such a system needs to:

- Organise task-dependent data and use this data to make predictions.
- Understand its environment by linking sensory information to physical location.
- Interact with its environment by planning routes and manipulating objects.

The course will be accompanied by small coding projects in Python that demonstrate the application of these concepts in a series of practical scenarios.

In particular, the course covers the following topics:

[The State of AI] Historical developments, emerging trends and open questions
[Tools & Techniques] AI-assisted productivity and creativity
[The AI Pipeline] From hard-coded rules to learned decisions
[Data] Collection, representation and analysis of data
[Hello World] Algebraic, analytical and statistical foundations of AI
[Supervised Learning I] Data-driven models of reality: classification and regression
[Supervised Learning II] Data-driven models of reality: model complexity and regularisation

[Unsupervised Learning] Identifying patterns without annotations
[From Perception to Action I] Visual AI: understanding information in images
[From Perception to Action II] Visual AI: localising information in images
[From Perception to Action III] Embodied AI: manipulating environments
[From Perception to Action IV] Embodied AI: navigating environments
[Guest Lecture] Industrial applications of AI in the automotive industry
[AI & U] Working with and contributing to the future of AI

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes

- Students understand the structure of the AI landscape, including its various sub-fields and how they are interconnected.
- They can formulate industry tasks as learning problems (supervised, unsupervised, reinforcement) and select an appropriate AI framework for the type of data in question.
- They are familiar with the individual components of the selected AI framework — (1) data acquisition and representation; (2) model specification and optimisation; and (3) performance evaluation and analysis — and can set up and execute this pipeline.
- The students understand the role of embodied AI and the challenges and solutions associated with it, such as perception, kinematics and navigation.

Literature
W. Ertel: Introduction to Artificial Intelligence, Springer, 2024.
C. Bishop: Pattern Recognition and Machine Learning, Springer, 2016.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003853
Artificial Intelligence in Marketing and E-Commerce

Module profile

Exam number
5003853

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Ivan Yamshchikov

Lecturer(s)
Prof. Dr. Ivan Yamshchikov

Applicability	BEC
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
The use of artificial intelligence is fundamentally transforming business models and processes in digital commerce. Companies use AI to personalise customer experiences, utilise marketing budgets more efficiently and make data-driven decisions throughout the customer journey. In this module, students will learn about key methods of artificial intelligence and apply them to typical problems in marketing and e-commerce. The focus is not only on technical understanding, but also on business evaluation and ethical reflection.

I. Typical problems in marketing and e-commerce:
- Introduction to artificial intelligence and machine learning in e-commerce
- Personalisation and recommendation engines
- Customer classification and segmentation using clustering and decision trees
- Predictive models for purchasing behaviour, churn prediction and dynamic pricing
- Chatbots and language models in customer service (fundamentals of natural language processing)
- Automation of online advertising and campaign management using AI
- Data protection, algorithmic fairness and ethical considerations in the use of AI

II. Technical scope.

Introduction to Artificial Intelligence (AI)
Overview: The development of AI over recent decades.
Concepts: The difference between symbolic AI (logic-based) and sub-symbolic AI (data-based).
Classical methods: Early models such as Adatron, Boltzmann machines, Hopfield networks and cellular automata.
Knowledge representation: Introduction to semantic networks, ontologies and (fuzzy) logic.

Key Concepts and Principles of Machine Learning (ML)
Types of learning: Supervised, unsupervised and reinforcement learning.

Learning objectives: Predictions (regression/classification) and knowledge discovery (clustering/density estimation).
Formalisation: The mathematical description of the learning problem.
Ethics: Societal impacts and ethical issues surrounding ML.

Fundamentals of Learning from Data
Objective function: The loss function
Risk: Expected and empirical risk in learning.
Model complexity: Overfitting and underfitting.
Process: Training, validation and testing of models.
Evaluation: How to evaluate models and select the best one.

Selected Machine Learning Algorithms
Linear models: For predicting values or categories.
Regularisation: Methods such as ridge regression to avoid errors.
Feature selection: Sparse models (e.g. Lasso) for identifying important data features.
Mixture models: K-means clustering and Gaussian mixture models (GMM).
Non-parametric methods: Kernel methods, decision trees and random forests.

Programming for machine learning
Languages: Practical work with Python.
Tools: Use of key libraries such as NumPy, Pandas, Scikit-learn and Jupyter Notebooks.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will have acquired the following skills:
1. Students understand the fundamental methods of artificial intelligence and their application in digital marketing and e-commerce. They analyse business-related data and develop AI-supported solutions for personalisation, customer retention and improving efficiency in digital business models.
2. Students work together in project groups in a goal-oriented manner and take on roles in technical and business-related problem-solving. They communicate their findings in a manner appropriate to the audience and critically reflect on team processes.
3. Students apply fundamental techniques of machine learning, segmentation, recommendation systems and predictive modelling in a practical context. They use commercially available tools (e.g. Google AI, Python) to analyse and develop data-driven solutions.
4. They develop their ability to acquire knowledge independently and critically reflect on the contribution of AI to digital business strategies.

Literature
1. Bishop, Christopher M. Pattern Recognition and Machine Learning. Information Science and Statistics. New York: Springer, 2006.
2. Murphy, Kevin P. Machine Learning: A Probabilistic Perspective. Adaptive Computation and Machine Learning Series. Cambridge, MA: MIT Press, 2012.
3. Hastie, Trevor, Robert Tibshirani, and Jerome Friedman. The Elements of Statistical Learning. Springer Series in Statistics. New York, NY, USA: Springer New York Inc., 2001.
4. Russel, S, Norwig, P. Artificial Intelligence: A Modern Approach, Pearson, 2022

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003133
Logistics Management in E-Commerce

Module profile

Exam number
5003133

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 40 hrs

Self-study: 110 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Oliver Dahms

Applicability	BEC, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
An interest in logistics, analytical skills, and the ability to think in a networked and interdisciplinary manner

Content
This module provides a holistic understanding of the logistics value chain in e-commerce, from the strategic selection of fulfilment models through to the technical implementation of intralogistics systems. Students engage in-depth with the CEP sector (courier, express and parcel services) and its networks, as these form the critical interface with the end customer.

A technical focus is placed on the planning and sizing of intralogistics systems. Based on analyses of real-world order and product structures, students learn to plan material flows and select suitable warehousing and order-picking techniques. In addition, operational management aspects such as staff resource planning, performance management using SLAs and KPIs, and returns management are covered. The module is rounded off by modern approaches to re-commerce, with a view to sustainably closing ecological and economic cycles.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students …

- evaluate different fulfilment strategies (make-or-buy), taking into account costs, flexibility and service quality, in order to make informed sourcing decisions.
- analyse the structures and trends within the CEP sector, as well as its networks, in order to understand the interdependencies of the 'last mile' in e-commerce.
- analyse complex product and order data (e.g. using ABC analysis) to derive quantitative requirements for logistics systems.
- develop preliminary concepts for intralogistics systems by selecting and combining suitable subsystems (warehousing, conveyor and order-picking technology) based on the requirements data.
- Apply staff deployment planning methods to develop flexible working time models that efficiently cushion fluctuations in order volumes.
- Create a key performance indicator (KPI) system and define service level agreements (SLAs) to manage the performance of internal or external logistics processes.
- develop concepts for efficient returns management and re-commerce to handle returns rates cost-effectively and return products to the recycling loop.

Literature
Aggtelekey, B. – Factory Planning, Volumes 1–3
Jünemann, R. – Material Flow and Logistics
Pfohl, H.-C. – Logistics Systems
Gudehus, T. – Logistics: Fundamentals, Strategies, Applications
Arnold, D.; Isermann, H. – Handbook of Logistics
Fischer, M.; Dittrich, L. – Material Flow and Logistics
Goldratt, E. M.; Cox, J. – The Goal
Packard, D. – The Hewlett-Packard Story
Peters, T. – In Search of Excellence
Womack, J. P. – The Second Revolution in the Automotive Industry
Masaaki, I. – Kaizen
Michael Pulverich, Jörg Schietinger – Handbook of Order Picking
Jay R. Galbraith – Designing Organisations
Helmut Baumgarten – The Best of Logistics
Willibald A. Günthner – Technical Innovations for Logistics
Detlef Spee – Successfully Implementing Lean Warehousing
Detlef Spee – Designing Efficient Warehouse Processes

Module: 5003069
Mobile Applications

Module profile

Exam number
5003069

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 50 hrs

Self-study: 100 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Peter Braun

Lecturer(s)
Prof. Dr. Peter Braun

Applicability	BEC, BIN, BWI, BISD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
Good programming skills (e.g. from Programming 1 and 2, Web Programming 1 to 3) or equivalent.

Recommended prerequisites for the participation in the module
none

Content
This module introduces software development for mobile devices. The Android operating system and/or iOS will be used in the course. The development environment will be Flutter on Android Studio or VS Code. Dart will be used as the programming language. No prior knowledge of Dart programming is required, but a good understanding of other languages (e.g. Java, Python or JavaScript) is essential.

Introduction to Dart Programming
- Brief overview of Flutter: history, advantages and architecture.
- Introduction to the Dart programming language.
- Setting up the development environment.

Introduction to Flutter – Flutter GUI development
- Understanding widgets and basic UI elements.
- Understanding stateful and stateless widgets.
- Layout widgets: Row, Column, Stack, etc.
- Basic interaction elements: buttons, sliders and switches.

Navigation and State Management
- Navigation patterns: push/pop navigation, named routes.
- State management basics: setState, Provider.
- Implementing forms and handling user input.

Working with External Data
- Fetching data from the internet (APIs).
- JSON serialisation and deserialisation.
- Firebase

Integrating Device APIs such as Location and Camera
- Introduction to device APIs in Flutter.
- Implementing location services: retrieving and using GPS data.
- Accessing and using the camera: taking photographs and recording video.
- Handling permissions for location and camera.

Testing Advanced Features and Best Practices
- Animations and transitions.

- Using custom fonts and assets.
- Best practices in Flutter development.
- Testing Flutter apps

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes

- Students gain an understanding of the fundamentals of mobile application development using Flutter for Android and iOS, with a focus on professional programming practices.
- Students apply concepts of asynchronous programming and thread management to handle complex tasks in mobile applications efficiently.
- Students analyse architectural concepts for mobile solutions, including the division of responsibilities between client and server and communication protocols for mobile devices.
- Students design mobile user interfaces based on reusable software components, ensuring an intuitive and consistent user experience.
- Students implement mobile applications that integrate sensor data analysis and server communication, following best practice in mobile development.
- Students evaluate different mobile architecture approaches and technologies to select the most suitable solutions for specific application requirements.
- Students create a fully functional mobile application for Android or iOS, including publication and deployment.

Literature
Dieter Meiller: Modern App Development with Dart and Flutter 2: A comprehensive introduction to Flutter. De Gruyter Oldenbourg, 2021.

Module: 6102800
Project Work

Module profile

Exam number
6102800

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
4

ECTS-Credits (CP)
10.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 240 hrs

Total: 300 hrs

Teaching format
Project

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele,
Prof. Dr. Christina Völkl-Wolf,
Prof. Dr. Rolf Schillinger,
Prof. Dr. Tristan Wimmer,
Prof. Dr. Mila Vogelsang

Applicability	BEC
Semester according to SPO	6. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
100 ECTS credits

Recommended prerequisites for the participation in the module
none

Content
Project work is usually carried out in teams (at least three students). It involves either end-to-end software development in accordance with the principles of software engineering, or another task from the field of IT (e.g. software comparison, software selection, software implementation). Each project is supervised by a professor from the Faculty of Computer Science and Business Informatics. As part of the project work, students practise the techniques and methods of business informatics they have learnt in a practical professional context (teamwork; project organisation; practical tasks).
Minimum content requirements for the written project report:

- For software development
- Specification document setting out the requirements for the project (including milestones/timetable)
- Technical design using appropriate methods
- IT design
- Programme listing
- User manual
- Appendix (bibliography; list of abbreviations, glossary, etc.)
- For other types of project:
- Project description setting out the requirements for the project (including milestones/timetable)
- Further content to be specified by the supervising professor, arising from the specific nature of the respective assignment
- Appendix (bibliography; list of abbreviations, glossary, etc.)

In the traditional degree programme, the topics for the practical examples used in the assessment are provided by the lecturer or agreed with them. In the dual study programme, a task from a real-world business context is undertaken in consultation with the lecturer.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
error

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
Students are able to approach and solve complex problems using appropriate methods.
Students are able to develop and implement suitable solution strategies as part of a team. They understand how team processes work and how they can contribute their own personality to these processes.

Literature
depending on the specific project work

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003865
Quantum Computing

Module profile

Exam number
5003865

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Frank-Michael Schleif

Lecturer(s)
Dr. Divyarani Mandya Shivakumar

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Basic Linear Algebra and Python Programming

Content
This course provides a comprehensive introduction to the principles, mathematical foundations, hardware concepts and programming tools of quantum computing. Students will explore qubits, superposition, entanglement, quantum gates, algorithms, noise models, error correction and real-world applications. Practical sessions using Qiskit enable learners to construct and simulate quantum circuits and run programmes on IBM Quantum devices.

1. Foundations of Quantum Computing
Classical versus quantum computation, qubits and quantum states, superposition and entanglement, Dirac notation (bras and kets), Bloch sphere representation, quantum measurement and collapse, physical implementations of qubits: superconducting, ion traps, photonic systems.
2. Quantum Gates and Quantum Circuits
Single-qubit gates: Pauli-X, Y, Z, Hadamard (H), Phase, S, T; multi-qubit gates: CNOT, Swap, Controlled phase; building quantum circuits; reversible computing principles; quantum circuit simulation tools; IBM Qiskit basics; circuit construction and visualisation; noise, error sources and decoherence.
3. Quantum Algorithms
Quantum parallelism, Deutsch–Jozsa algorithm, Grover's search algorithm, Shor's factoring algorithm, Quantum Fourier Transform (QFT), Phase estimation, Variational Quantum Algorithms (VQA): VQE, QAOA
4. Quantum Hardware, Noise & Error Correction
NISQ (Noisy Intermediate-Scale Quantum) era systems, Quantum noise models: Bit flip, phase flip, depolarising noise, basics of quantum error correction: Shor code, Steane code, surface code (overview), fault-tolerant quantum computation, claims of quantum supremacy (Google, IBM).
5. Applications, Future Trends & Quantum Programming
Quantum cryptography (BB84, QKD), Post-Quantum Cryptography (PQC), basics of Quantum Machine Learning (QML), Quantum optimisation (QAOA use cases), Quantum simulation in chemistry & physics Hands-on Qiskit programming: Creating circuits, running them on simulators, running them on IBM Quantum systems.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the course, students will be able to
1. Explain the fundamental concepts of qubits, superposition, entanglement and quantum measurement.
2. Construct and simulate quantum circuits using quantum gates and operators.
3. Analyse how major quantum algorithms work and identify their computational advantages.
4. Understand hardware constraints, quantum noise and basic quantum error correction techniques.
5. Implement quantum programmes using Qiskit and evaluate applications of quantum computing across various fields.

Literature
Textbooks:
1. Nielsen, M., & Chuang, I. *Quantum Computation and Quantum Information*, Cambridge University Press, 2010.
2. Yanofsky, N., & Mannucci, M. *Quantum Computing for Computer Scientists*, Cambridge University Press, 2008.
References:
1. IBM Quantum Documentation – https://quantum-computing.ibm.com
2. Qiskit Textbook – https://qiskit.org/learn
3. Preskill, J. Quantum Computing in the NISQ Era.
4. Arun P. Quantum Computing: An Applied Approach, Springer
Online resources (e-books, notes, PowerPoint presentations, video lectures, etc.):
1. Qiskit Tutorials: https://qiskit.org/tutorials
2. Quantum Algorithms Zoo: https://quantumalgorithmzoo.org
3. MIT OCW – Quantum Computation
4. IBM Quantum Lab (free cloud access).

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003067
Requirements Engineering

Module profile

Exam number
5003067

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Isabel John

Lecturer(s)
Prof. Dr. Isabel John,
Dr. Anne Heß,
Dr.-Ing. Benedikt Kämpgen

Applicability	BEC, BIN, BWI, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Software Engineering / Software Development

Content
This module focuses on the crucial initial phase of the software development lifecycle, during which the system's requirements and constraints are gathered, analysed and documented. Similarly, machine learning (ML) system development projects benefit from RE. This module therefore covers requirements engineering techniques for both traditional systems and ML systems.

Basics of Requirements Engineering
Task-Oriented and Goal-Oriented RE
Elicitation Techniques
Analysis Techniques
Specification and Modelling Techniques
Validation Techniques
RE in User Experience Engineering
RE Skills
Case Studies and Applications of Requirements Engineering
Requirements Engineering for Machine Learning Systems
Requirements Engineering in the Age of ChatGPT and Generative Artificial Intelligence

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes
Students recall fundamental RE models, methods and their relevance to the software development process.
Students understand the importance of requirements engineering, including stakeholder analysis, in a variety of project contexts, including international and AI-driven projects.
Students apply requirements elicitation techniques and modelling methods, such as UML, use cases, user stories and non-functional requirements, to real-world scenarios.
Students analyse requirements through negotiation, prioritisation and validation against quality criteria to ensure completeness and clarity.
Students evaluate different RE approaches and adapt techniques suited to specific domains such as machine learning and generative AI systems.
Students create comprehensive requirements specifications and models that address the needs of complex, modern software systems, including AI applications.
Students are able to adapt requirements engineering techniques for generative artificial intelligence-based systems

Literature
Cockburn, *Writing Effective Use Cases*, Addison Wesley, 2016
Hull, *Requirements Engineering*, Springer Verlag, 2019
Berenbach, *Software & Systems Requirements Engineering: In Practice*, McGraw Hill, 2017
Chris Rupp & the SOPHISTs, Requirements Engineering (in German), Hanser, 2022
Huyen, Chip. Designing Machine Learning Systems. O'Reilly Media, Inc., 2022.

Module: 5003857
Seminar Smart Systems

Module profile

Exam number
5003857

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Arndt Balzer

Lecturer(s)
Prof. Dr. Arndt Balzer

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Courses in the field of Computer Engineering

Content
Content: In the specialisation module, students work independently on topics relating to smart systems. They develop and present solutions (involving both hardware and software).
Topics from previous years (selection): AI-based checkout, Braille reader, inverse pendulum, Kalman filtering, pathfinding with Turtlebot, quadcopter, radar + lidar, ROS (Robot Operating System), SDR (Software-Defined Radio), SLAM (mapping, localisation, navigation), supervised learning, reinforcement learning, rock-paper-scissors on Pepper, Wi-Fi indoor localisation, …
The seminar is organised under a regularly updated overarching theme, within which individual topics are assigned. The topics are determined at the start of the seminar and are based on current developments. Areas of interest always include actuators and sensors, low-performance systems right through to smartphones, their programming and the evaluation of prototype implementations.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Multimedia presentation, Colloquium

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Learning objectives: By exploring a selected topic, students will develop their ability to engage with challenging subjects.

- Students will acquire fundamental mathematical and technical knowledge
- From this, they will derive the specialist knowledge required for their specific topic or field of application
- They apply this knowledge using the methods they have learnt and gain further confidence in their application

The findings are documented and the results are presented at the end of the seminar

- Students acquire the ability to document and present results clearly.
- Students apply methods of scientific work, including (literature) research.
- Students develop their ability to independently expand their existing knowledge and to quickly familiarise themselves with topics covered by their fellow students

Literature

- To be announced in each case.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003854
Smart Agriculture

Module profile

Exam number
5003854

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Peter Braun

Lecturer(s)
Prof. Dr. Peter Braun,
Prof. Dr. Isabel John

Applicability	BIN, BWI, BEC
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
None

Recommended prerequisites for the participation in the module
None

Content
The module addresses typical challenges in smart agriculture using a specific example: the systematic collection of data in the field using drones, the structured processing and analysis of image data, and the derivation of transparent key performance indicators and maps as a basis for an initial assessment. Building on this, methods for image-based detection and quantification of anomalies are developed and integrated into a simple data management system with visualisation. A further focus is on the validation of image-based findings using independent measurement values, as well as on the statistical testing and interpretation of relationships using correlations. Implementation takes the form of prototypes, comprising software artefacts and presentations of results.

The module is run in cooperation with our partner institution, Suwa University of Technology in Japan, and is supported by teaching contributions from professors at the partner university. An important part of the module is an excursion to Suwa University, during which the prototype results are further developed, validated and presented jointly with Japanese students. Intercultural content covers etiquette, communication styles in emails and video conferences, collaborative laboratory work, projects and presentations, as well as conduct and everyday customs whilst in Japan.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes

- Students describe key data sources and outputs (drone images/ logs, AI results, measurement values) and organise them into a consistent data flow.
- Students implement a transparent data pipeline in Python, including simple quality controls and reproducible exports (e.g. GeoTIFF/PNG, reports).
- A group of students calculates ExG/VARI/NDVI and critically interprets index maps under field conditions (changes in light, shade, missing bands).
- A group of students explains fundamental AI tasks (classification, detection, segmentation) and assesses their limitations due to domain shift and uncertainty in the field.
- A group of students correlates physiological measurements (Fv/Fm, chlorophyll index) with image/AI metrics (Pearson/Spearman) and derives an evidence-based assessment from this.
- Students explain basic etiquette and courtesies within the Japanese higher education environment and use this to determine appropriate behaviour in meetings and whilst on site.
- Students draft professional emails and prepare for video conferences with Japanese contacts in a structured manner.
- Students carry out their project using appropriate project management methods and take intercultural project management aspects into account during the field trip and when interacting with Japanese students.

Literature
This will be announced later in the seminar.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003098
Social Media in the business world

Module profile

Exam number
5003098

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 40 hrs

Self-study: 110 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Tobias Tellers,
Philipp Oberkalkofen

Applicability	BEC, BDGD, BISD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
- Basic knowledge of social media and how to use online applications
- An interest in corporate communications

Content
The module focuses on the professional development and implementation of social media strategies. Students learn to define strategic objectives and analyse target audiences in a nuanced way. They gain a comprehensive overview of relevant social media channels and their targeted use, in particular blogs, Facebook, X (formerly Twitter), YouTube, Instagram and professional networks such as XING and LinkedIn. Another key focus is on the effective combination and integration of these platforms, as well as their incorporation into overarching marketing strategies.

In addition, methods for monitoring, measuring success and social media control are taught. Particular attention is paid to community management as a key factor for successful communication on social networks. This includes developing a community strategy, the fundamentals of online dialogue, dealing with challenges such as trolls or online backlash, and the basic principles of crisis communication. Students also learn how community engagement can be specifically encouraged and positively influenced by psychological factors. This subject area is complemented by the development of a content strategy, the use of social customer service and appropriate methods for monitoring the success of community initiatives.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will be able to:
Students identify key concepts, building blocks and technical fundamentals of social media strategies in a business context.
Students can classify competing social media platforms, target audiences and communication formats, and explain their respective applications.
Students apply principles of community management in practical situations to activate, moderate and maintain online communities.
Students distinguish between typical dialogue situations and challenges in social media dialogue and structure corresponding interaction and response patterns.
Students assess the success of social media initiatives using basic monitoring and analysis tools and derive well-founded recommendations for action from their findings.
Students develop a comprehensive social media strategy, including objective setting, channel selection, content planning and integration with overarching marketing objectives.

Literature
Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. Journal of the Academy of Marketing Science, 48(1), 79–95.
Rana, N. P., Slade, E. L., Dwivedi, Y. K., & Tajvidi, M. (eds.). (2020). Digital and Social Media Marketing: Emerging Applications and Theoretical Development. Springer.
Wolff, C. (2024). Social media strategies for B2B companies. Springer Gabler.
Tajvidi, M., Wang, Y., Hajli, N., & Love, P. E. D. (2021). Brand value co-creation in social commerce: The role of interactivity, social support, and relationship quality. International Journal of Information Management, 57.
Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2018). Advances in social media research: Past, present and future. Information Systems Frontiers, 20, 531–558.
Opresnik, M. O., & Hollensen, S. (2023). Social Media Marketing: A Practitioner's Guide. Springer.

Module: 5003810
Software Testing

Module profile

Exam number
5003810

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Peter Braun

Lecturer(s)
Pascal Moll

Applicability	BEC, BIN, BWI, BISD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
None

Recommended prerequisites for the participation in the module
Programming I, Back-end Programming, Programming in Python, or Fundamentals of Programming; Object-Oriented Programming in Java
Participants will be provided with a virtual machine, the functionality of which should be tested before the course begins.

Content
This module covers various types of testing and their application in software development. It teaches the SOLID principles and the four-layer concept for test architectures. It also covers the automated testing of user interfaces and APIs, as well as the use of mocking. Another key focus is Behaviour-Driven Development with Cucumber. Exploratory testing and the integration of automated tests into a DevOps life cycle are also covered. The module includes practical content, for which a virtual machine is provided. This requires the installation of VirtualBox.

- Fundamentals of testing (test coverage, test paths, black-box, white-box and grey-box testing, functional and non-functional tests, test pyramid)
- Test automation (objectives, success factors, differences between various types, JUnit test framework, annotations, assertions, exception testing, parameterisation, test types, record and replay, scripted testing, keyword-driven testing)
- Test architecture (SOLID principles, 4-layer concept, test modelling layer, test definition, test execution, test adaptation, interfaces, design and development, key design patterns for testing)
- Testing graphical user interfaces (introduction to Selenium, drivers, the PageObject pattern, identifiers, waits, cookies)
- Mocking (WireMock)
- Behaviour-Driven Development (Feature Files & Step Files, Cucumber & Gherkin, Parameters, Data Tables, Scenario Outlines and Background, Runner Classes)
- Exploratory Testing (Methods and Techniques)
- Build Servers (Jenkins Fundamentals & DevOps Fundamentals, gPipelines, the DevOps Process from a Testing Perspective)

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
None

Learning outcomes

- Students define test objectives for a piece of software.
- Students analyse test objectives and define appropriate test types.
- Students translate test types into automated tests.
- Students decide on the use of design patterns in testing and apply design patterns.
- Students explain Behaviour-Driven Development.
- Students set up and configure a build server for testing.

Literature

- Essentials of Software Testing* by Ralf Bierig, Stephen Brown, Edgar Galván and Joe Timoney, 2021, Cambridge University Press

Module: 6150279
Transfer colloquium

Module profile

Exam number
6150279

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele

Applicability	BEC
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
For dual-study students on the BEC programme only

Recommended prerequisites for the participation in the module
none

Content
The Transfer Colloquium is designed to facilitate discussion amongst students on the dual study programme and replaces one of the FWPM sessions. Students on the standard version of the degree programme do not take part in this session. The session takes place across the third to seventh semesters, with the exception of the work placement semester. Under the guidance of a lecturer, dual-study students discuss the following topics:

- Introduction and overview: Presentation of the Transfer Colloquium and its objectives; explanation of the importance of exchanging experiences between the university and the company for dual-study students.
- Reflection on practical experience: In-depth reflection on the knowledge and skills acquired during studies and in practical work, as well as their application in day-to-day business operations.
- Exchange of experiences: Moderated discussions on challenges and solutions relating to the coordination of university studies and practical work within the company.
- Best-practice examples: Presentation and discussion of successful projects and practices from the company that have been implemented by students during their studies and in practical work.
- Problem-solving strategies: Development and presentation of approaches to solving typical problems that may arise in a dual study programme, including time management and prioritisation.
- Application of theoretical knowledge: Deepening students' understanding of how theoretical knowledge from university modules can be applied in practice within the company.
- IT security in the company: An introduction to the importance and practical implementation of IT security measures, based on theoretical principles and practical applications.
- Project documentation and presentation: Training in the preparation and presentation of project documentation to present the work carried out within the company in a structured manner.
- Feedback and continuous improvement: Systematic collection and analysis of feedback from companies and the university to ensure the continuous improvement of the dual study programme.
- Professional development and career planning: Discussion of career paths and development opportunities for dual-study students,

based on the skills acquired during their studies and in practical work.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
Compulsory attendance

Learning outcomes
Students systematically reflect on their practical experiences in order to draw conclusions for their professional development.
Students develop strategies for resolving problems that arise when balancing their studies with practical work.
Students apply the theoretical knowledge they have acquired in a practical context within the organisation in order to optimise the transfer of knowledge between higher education and the workplace.
Students communicate their practical experiences clearly and in a structured manner and present their findings effectively.
Students assess the importance of IT security in a business context and implement appropriate measures in their day-to-day work.
Students produce professional project documentation to ensure their work is transparent and traceable.
Students use feedback constructively to continuously improve their working methods and the collaboration between the university and the company.

Literature
To be announced during the seminar.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5007211
Mobile and Ubiquitous Concepts and Development

Module profile

Exam number
5007211

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Karsten Huffstadt

Lecturer(s)
Prof. Dr. Karsten Huffstadt

Applicability	BEC, BWI
Semester according to SPO	6. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits, course 5002530 or 5102530 or 6102410

Recommended prerequisites for the participation in the module
none

Content
The 'Mobile and Ubiquitous Concepts and Development' module offers students the opportunity to specialise either in technical or conceptual aspects. The focus is on the development of a digital product or service for mobile or ubiquitous usage contexts – either in the form of a functional prototype or a strategically sound marketing concept.

Students focusing on technology and development create a fully functional application that they have programmed themselves (e.g. using Flutter, web technologies or native tools), whilst concept-oriented participants develop a comprehensive business, marketing or interaction concept – including target group analysis, value proposition, customer journey and monetisation strategy. Both options are based on real-world challenges and conclude with a presentation of the solution. In this way, the module promotes both application-oriented programming skills and strategic, creative conceptualisation abilities.

Specific content includes:
- Areas of application for mobile and ubiquitous systems
- Tools for rapid app/web development (e.g. Flutter, Firebase, web technologies)
- Conceptualisation and design of context-sensitive mobile services
- Customer experience and interaction strategy
- Market and user analysis, value proposition design
- Monetisation and scaling (e.g. freemium, subscription, platform models)
- Agile methods and iterative project development
- Testing, user feedback and optimisation
- Presentation and pitching of digital products

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon completion of the module, students will be able to:

- identify technologies, business models and success factors in the field of mobile and ubiquitous applications (to remember)
- explain the requirements and specific characteristics of mobility, context sensitivity and user needs in digital systems (to understand)
- either use technical development tools (e.g. Flutter, web stacks),

or apply methods for ideation, market analysis and business modelling (to apply)

- analyse usage contexts and problem statements in order to derive functional or strategic solutions (to analyse)
- critically evaluate one's own and others' concepts or applications in terms of utility, feasibility, innovative content and market viability (to evaluate)
- either programme a functioning application

or create a viable, structured marketing or application concept (to create)

Literature
Ries, E. (2011). The Lean Startup. Crown Publishing
Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation. Wiley
Rogers, Y., Sharp, H., & Preece, J. (2023). Interaction Design. Wiley
Cook, D. (2021). Flutter for Beginners. Packt Publishing
Norman, D. A. (2013). The Design of Everyday Things. Basic Books

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6106201
Process and Landing Page Optimization

Module profile

Exam number
6106201

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
André Morys,
Ina Reinhardt

Applicability	BEC
Semester according to SPO	6. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits, course 6102410

Recommended prerequisites for the participation in the module
None

Content
This module teaches a systematic, evidence-based approach to improving conversion rates and the user experience in e-commerce. Students learn how to apply holistic conversion optimisation frameworks (e.g. the 7-level model) in order to identify and realise optimisation potential in a structured manner.
The process begins with the analysis phase: this involves combining technical audits, heuristic analyses of websites and processes, and quantitative web analytics data. In addition, qualitative methods such as interview techniques and user testing (including eye-tracking) are used to understand the 'why' behind user behaviour. Building on this, target-group-specific personas are developed.
In the conception and implementation phase, students translate psychological principles of behavioural economics into concrete designs. A key focus is on the design and technical implementation of high-converting landing pages that are precisely tailored to online marketing campaigns.
Finally, the module covers the validation of optimisation measures. Students learn to design, conduct and evaluate statistically valid A/B and multivariate tests in order to replace subjective design decisions with objective data.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students ...

- apply established conversion optimisation frameworks to structure the optimisation process within organisations in a structured and iterative manner.
- analyse websites and checkout processes from both a technical and heuristic perspective to identify usability barriers and conversion killers.
- apply methods of quantitative web analytics as well as qualitative techniques (interviews, eye-tracking) to gain in-depth user insights and formulate data-driven optimisation hypotheses.
- Create data-driven personas to make user needs tangible and personalise the messaging in marketing campaigns.
- apply principles of behavioural economics (e.g. scarcity, social proof, loss aversion) in a targeted manner to guide users' decision-making behaviour in an ethically sound way (nudging).
- Create high-conversion landing pages whose design and content are precisely tailored to the upstream marketing campaigns (ad-scent).
- Develop concepts for A/B and multivariate tests and evaluate their results statistically to provide valid evidence of the effectiveness of changes.

Literature
Ariely, Dan: Predictably Irrational
Kahneman, Daniel: Thinking, Fast and Slow
Morys, André: Conversion Optimisation
Vollmert, Markus; Lück, Heike: Google Analytics 4

Various recent (online) specialist articles, which will be provided by the lecturer as appropriate to the topic

Module: 6108201
Shop Systems

Module profile

Exam number
6108201

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Dr. Rolf Schillinger,
Oliver Dahms,
Prof. Dr. Tristan Wimmer

Applicability	BEC
Semester according to SPO	6. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits, course 6102410

Recommended prerequisites for the participation in the module
Web Programming I–III, Web Application and Development Systems, Introduction to Web Technologies

Content
In this module, students will explore the following topics:
Taxonomy of current shop system variants
- Cloud / on-premises systems
- Open-source / proprietary systems
- Standalone systems / part of (ERP) platforms

Data and data management
- ERP
- PIM

Hands-on deployments
- On-premises e-commerce system
- Cloud-only e-commerce system
- Integrating an e-commerce system with an ERP system using connectors

Integration of marketplaces and external services
- Amazon
- eBay
- Price comparison websites

Multichannel platforms
- General functionality
- Example project on a multichannel platform

Logistics / fulfilment

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will be able to:

- distinguish between the main types of e-commerce systems
- plan an optimal e-commerce platform based on project requirements
- set up, deploy and configure e-commerce systems themselves
- to plan and implement the integration of e-commerce systems with price comparison websites
- to connect e-commerce systems to multiple sales channels via multichannel platforms
- to distinguish between different operational models for logistics and fulfilment solutions and to select the appropriate one based on project requirements

Literature
To be announced during the event.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6106100
Seminar Conversion Optimization

Module profile

Exam number
6106100

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele,
Prof. Dr. Rolf Schillinger

Applicability	BEC
Semester according to SPO	6. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
None

Recommended prerequisites for the participation in the module
None

Content
This seminar is dedicated to an academic and practice-oriented examination of current trends, methods and technologies in optimisation and experimentation. Students move beyond the realm of 'best practices' to analyse evidence-based approaches at the interface between data analysis, behavioural psychology and user experience design.

The content covers the entire spectrum: from behavioural economics and cognitive biases, through technical tracking challenges (e.g. server-side tracking, a 'cookieless future') to the measurement of emotions (neuromarketing) in e-commerce. Particular emphasis is placed on the critical reflection on ethical aspects ('dark patterns') and the use of artificial intelligence for personalisation and test automation.

The assessment consists of a written academic paper on a specific subject area, as well as the presentation and defence of the findings in a plenary session. This fosters the ability to present complex issues concisely and to discuss them in a substantively sound manner.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Term paper, Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students ...

- analyse current academic studies and specialist publications on specific topics relating to conversion optimisation in order to gain a structured understanding of the current state of research.
- assess the applicability of behavioural economics principles (e.g. nudging, the decoy effect) to specific e-commerce scenarios, whilst taking ethical boundaries into account.
- evaluate various data collection methods (e.g. eye-tracking, emotion measurement, A/B testing) in terms of their validity, reliability and suitability for specific optimisation questions.
- analyse the impact of technical and legal changes (e.g. GDPR, cookie restrictions) on the quality of web analytics data and tracking concepts.
- produce a structured academic paper that provides a theoretically sound and practical answer to a complex question relating to conversion optimisation.
- produce a target-audience-oriented presentation of their research findings and visualise complex relationships in an understandable way.
- critically evaluate their fellow students' work during the specialist discussion and defend their own theses with well-reasoned arguments against objections.

Literature
the students' own research based on the topic

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5007110
Seminar Mobile and Ubiquitous Solutions

Module profile

Exam number
5007110

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Karsten Huffstadt

Lecturer(s)
Prof. Dr. Karsten Huffstadt,
Prof. Dr. Isabel John

Applicability	BEC, BWI
Semester according to SPO	6. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits, course code 5X02530

Recommended prerequisites for the participation in the module
none

Content
This module combines the application-oriented perspective of mobile and ubiquitous systems with the requirements of academic work. It focuses on examining current issues, concepts and technologies in the fields of mobile computing, context awareness, smart environments and human-centred design.

Students develop an initial research question on a topic of their own choosing or one suggested by the course, and address this in a theory-driven and structured manner within the framework of an academic paper. In doing so, they engage with specialist literature, current research trends and methodological approaches. In addition to writing the paper, the module also focuses on academic presentation – including a discussion and feedback session. The module also serves as preparation for the Bachelor's thesis, both in terms of content and methodology.

Key content includes:
- Analysis of practical use cases of mobile systems within an academic context
- An initial introduction to academic working techniques and text types (paper, abstract, discussion)
- Development of sound research questions in the context of mobile/ ubiquitous systems
- Literature review, theory development, methodological approach
- Academic writing and structuring
- Discussion of ethical, societal or design implications
- Presentation techniques for academic talks
- Peer review procedures, feedback formats
- Linking application perspectives with research reflection

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students are able to:

- identify key theories, concepts and current research approaches in the field of mobile and ubiquitous systems (to remember)
- distinguish between academic research questions and practical project ideas, and embed them within a theoretical framework (to understand)
- to apply practical knowledge and academic methods (e.g. systematic literature review, theoretical modelling, exploratory analysis) to address a topic (to apply)
- to critically evaluate academic texts and construct their own argumentative structures (to analyse)
- to assess the quality, rigour and relevance of academic arguments in one's own paper and those of fellow students (to evaluate)
- to write an (initial) independent academic paper on a topic in the field of mobile and ubiquitous systems and to present it professionally (to create)

Literature
Kornmeier, M. (2022). Academic Writing Made Easy. Springer
Flick, U. (2023). Social Research: Methods and Applications. Rowohlt
Rogers, Y., Sharp, H., & Preece, J. (2023). Interaction Design. Wiley
Schmidt, A., & Kranz, M. (2017). Mobile Interaction. Oldenbourg
Weiser, M. (1999). The Computer for the 21st Century. Scientific American

Module: 6108100
Seminar Shop Systems

Module profile

Exam number
6108100

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 40 hrs

Self-study: 110 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Dr. Rolf Schillinger,
Prof. Dr. Tristan Wimmer

Applicability	BEC
Semester according to SPO	6. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits, course 6102410

Recommended prerequisites for the participation in the module
none

Content
In this seminar, students will explore current topics from all areas of the planning and implementation of online shop systems.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Term paper, Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students deepen their knowledge of shop systems and learn to contextualise and analyse current topics.

The written analysis and oral presentation of these topics prepare students for the relevant activities in their future professional or academic careers.

Literature
This will be announced in the seminar, depending on the topic

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003154
Video-Production & Video-Marketing

Module profile

Exam number
5003154

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 50 hrs

Self-study: 100 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Alexander Gillich,
Christian Huller

Applicability	BEC, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Part 1: Video Production
In the first part of the module, students are introduced to the individual steps involved in video production. The module covers the full spectrum, from mobile phone videos to cinema productions.

- Introduction and historical development of still and moving images
- Technology & techniques – the tension between low-budget and high-end productions
- Definition of terms: data format & moving image format
- Content & context
- Current developments in video marketing
- Production & post-production – from the idea to the finished film
- Application:

o Analysis & categorisation of current video formats (using a developed matrix)
o Derivation of a best-practice approach

- Practical section – video production

Part 2: Video marketing
The second part focuses on the effective online marketing of videos, with an emphasis on YouTube marketing.

- Video marketing – introduction & overview
- Video platforms – the current state of YouTube, Vimeo, Facebook, Snapchat and others
- Building a YouTube channel: Account creation, administration levels and functions
- Video SEO:

o Ranking factors and optimisation options for YouTube videos
o Channel optimisation
o CTAs: strategic use of information cards, end credits, watermarks and links as calls to action

- Community management: active and passive ways to increase channel subscribers and build trust
- Video monetisation – options, opportunities and risks
- Video advertising – advertising strategies and targeting options for video adverts
- YouTube Analytics – measuring the success of video content
- Brand communication, PR and product communication using videos
- Practical session – optimising the video produced in Part 1

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Students will recall key concepts, historical developments and fundamental technologies relating to image and video production and video marketing.
Students understand the relationship between content, context, technical implementation and marketing objectives of video formats in the e-commerce environment.
Students apply fundamental techniques of video production and post-production to independently produce a video tailored to a specific target audience, from the initial idea through to the finished piece.
Students analyse current video formats, platforms and YouTube channels based on defined criteria (e.g. format, target audience, monetisation, SEO factors).
Students evaluate video marketing strategies, optimisation measures and monetisation approaches in terms of reach, community building and economic benefit.
Students apply YouTube-specific tools (e.g. YouTube Studio, video SEO, Analytics, CTAs) to optimise videos and channels based on data.
Students develop a video concept, including production, optimisation and a marketing strategy, for a specific use case in e-commerce.

Literature
To be announced in the lecture

Module: 6322200
Virtual Reality

Module profile

Exam number
6322200

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction, Exercise

Language of instruction
German

Organisation

Responsible lecturer
Stefan Sauer

Lecturer(s)
Stefan Sauer

Applicability	BEC, BIN, BWI, BISD, BDGD
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
This event is organised by the Faculty of Plastics Technology and Surveying (FKV):
(https://geo.thws.de/studium/bachelor-geovisualisierung/studienablauf/modulhandbuch-bgv-ab-ws-202223/)

For scheduling: https://geo.thws.de/studium/aktuelle-lehrveranstaltungsplaene/

- Creating 3D models for integration into game engines
- Working with game engines
- Rendering pipeline
- Integration of VR functionalities into game engines
- Creation of fully functional 3D models within game engines
- Development of virtual tours

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon completion of this module, students will be able to independently plan, develop and set up VR applications, or publish them using relevant services.

Game engines are used to create VR environments. Students therefore learn the basics of importing and handling geodata in game engines, as well as the settings for rendering and preparing the data for VR applications, including the programming of controllers and the interface to the VR headset.

Literature
Akenine-Möller, T.; Haines, E.; Hoffman, N.; Pesce, A.; Iwanicki, M.; Hillaire, S.: Real-Time Rendering, 2018, 4th edition, Milton: Chapman and Hall/CRC, London, ISBN: 9781138627000 Edler, D.; Husar, A.; Keil, J.; Vetter, M. & Dickmann, F.: Virtual Reality (VR) and Open Source Software: A Workflow for Constructing an Interactive Cartographic VR Environment to Explore Urban Landscapes, 2018. In: Kartographische Nachrichten, Journal of Cartography and Geographic Information, 68(1), pp. 5–13, ISSN: 2524-4965
Edler, D.; Kühne, O.; Jenal, C.; Vetter, M.; Dickmann, F.: The Potential of Spatial Visualisation in Virtual Reality (VR) for Social Constructivist Landscape Research, 2018. In: Kartographische Nachrichten, Journal of Cartography and Geographic Information, 68(5), pp. 245–254, ISSN: 2524-4965
Vetter, M.: Technical Potentials for Visualisation in Virtual Reality, 2020. In D. Edler, C. Jenal, & O. Kühne (Eds.), Modern Approaches to the Visualisation of Landscapes, 2020, Wiesbaden: Springer VS, ISBN: 978-3-658-30956-5

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003855
Web Exploitation

Module profile

Exam number
5003855

Duration
1 semester

Frequency
Every summer semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr.-Ing. Sebastian Biedermann

Lecturer(s)
Prof. Dr.-Ing. Sebastian Biedermann

Applicability	BIN, BWI, BEC
Semester according to SPO	6. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
None

Content
Students learn about the professional role and methodological workflow of web penetration testers, including legal and ethical frameworks. Techniques for identifying and exploiting common web vulnerabilities (e.g., the OWASP Top Ten) in front-ends, back-ends and APIs are taught. Web post-exploitation scenarios (e.g., web shells, session hijacking, API abuse) and related containment considerations are practised in isolated labs. Finally, students learn how to produce structured reports and present their findings in a manner appropriate to the target audience.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
None

Learning outcomes
Upon completion of the module, students will be able to:

- describe the professional role of web penetration testers and their responsibilities within IT security.
- outline the typical workflow of a web penetration test (reconnaissance → enumeration → exploitation → post-exploitation → reporting).
- identify legal constraints, scope boundaries and ethical considerations and incorporate them into test planning.
- identify common web vulnerabilities (e.g., injection, XSS, CSRF, authentication issues) in test applications and produce reproducible proofs of concept.
- perform web post-exploitation techniques (e.g., session takeover, web shells, API abuse) in a laboratory setting and analyse their effects.
- Assess discovered vulnerabilities in terms of exploitability and business impact (e.g. using CVSS criteria) and set priorities for remediation.
- Document the results of a web penetration test in a structured report and present key findings in a manner appropriate to the target audience.

Literature
The Web Application Hackers' Handbook (Dafydd Stuttart et al.), 2023
Penetration Testing – A Hands-On Introduction to Hacking (Georgia Weidman), 2014
Hacking, The Next Generation (Nitesh Dhanjani et al.), 2021

7. semester

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6103700
Bachelor Thesis / Bachelor Seminar

Module profile

Exam number
6103700

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
1

ECTS-Credits (CP)
15.0

Workload
Guided study time:
Presence time: 40 hrs

Self-study: 410 hrs

Total: 450 hrs

Teaching format
Seminar

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele,
Prof. Dr. Christina Völkl-Wolf,
Prof. Dr. Rolf Schillinger,
Prof. Dr. Tristan Wimmer,
Prof. Dr. Mila Vogelsang

Applicability	BEC
Semester according to SPO	7. semester
Type of module	Compulsory module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits from Years 1–2, soft and professional skills modules, project work
Compulsory attendance at the Bachelor's seminar

Recommended prerequisites for the participation in the module
none

Content
The Bachelor's thesis module comprises the Bachelor's thesis (12 CP) and the Bachelor's seminar (3 CP).

The Bachelor's thesis includes, amongst other things, the student's own studies and research into the state of the art in the relevant subject area. In particular, the thesis must abstract away from constraints that are not technically justified by their very nature, but rather result from the specific circumstances of the company or organisation. Where software-based solutions are required as part of the assignment, this generally means that prototypes are to be implemented as part of the Bachelor's thesis; however, ensuring product specifications (including accompanying manuals, etc.) is not included.

The Bachelor's seminar includes, amongst other things, independent study and research into the state of the art within the respective subject area. In particular, the work must abstract from constraints that are not technically justified by their very nature, but rather result from the specific circumstances of the company or organisation. Where software-based solutions are required as part of the task, this generally means that prototypes are implemented as part of the Bachelor's thesis, but does not include ensuring product specifications (including accompanying manuals, etc.).

In the traditional degree programme, the topics for the practical examples used in the assessment are provided by the lecturer or agreed with them. In the dual study programme, a task from a real-world business context is worked on in consultation with the lecturer.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Thesis, Presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
Through their Bachelor's dissertation or seminar, students demonstrate that they are capable of independently solving a challenging problem in computer science (which may be interdisciplinary), that they have a firm grasp of the methodological and academic principles of the subject, and that they can present the results appropriately.

Literature
Depending on the topic set; the Bachelor's thesis must be written to an academic standard, i.e. the relevant literature must be thoroughly reviewed, utilised and cited in accordance with the topic.

Module: 5003848
Big Data Analytics

Module profile

Exam number
5003848

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Isabel John

Lecturer(s)
Prof. Dr. Rajesh Ramachandran

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
- Basic programming knowledge (Java/Python)
- Previous experience with databases and Linux is recommended

Content
This comprehensive course provides an in-depth introduction to Big Data technologies, focusing on Hadoop and its ecosystem. Participants will learn core concepts such as the Big Data 4 Vs, types of analytics and Hadoop architecture, followed by hands-on programming skills using MapReduce, Hadoop Streaming, Pig, Hive and Kafka. The modules combine theoretical knowledge with practical projects, including real-world case studies and an integrated data pipeline, preparing learners to handle large-scale data processing and analytics.
The course covers the following content:
- Understanding Big Data concepts, including the 4 Vs and types of analytics
- Overview of the Hadoop ecosystem and architectural components
- Programming with MapReduce using Java, including advanced techniques
- Developing Hadoop Streaming applications with Python/Shell scripts
- Exploring real-world case studies and mini-projects to gain practical experience
- Data analysis using Pig Latin and scripting operators
- Building data warehousing solutions using Hive and HiveQL
- Learning about Kafka's architecture, key topics and data pipeline integration
- Hands-on exercises with HDFS, YARN, Pig, Hive and Kafka
- Final project focusing on designing an end-to-end data processing pipeline

The course combines on-site teaching in Würzburg (one week in October) with online teaching for the remainder of the semester

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of this module, students will be able to:

- LO1: Explain the fundamental characteristics of Big Data systems and analytics.
- LO2: Operate Hadoop HDFS and carry out distributed storage and processing.
- LO3: Implement MapReduce programmes using Java, including advanced features such as distributed caching and joins.
- LO4: Use Pig Latin and HiveQL for high-level querying of large datasets.
- LO5: Demonstrate an understanding of real-time streaming using Apache Kafka.
- LO6: Develop integrated solutions using multiple components of the Hadoop ecosystem.

Literature
Tom White, *Hadoop: The Definitive Guide* (2012), O'Reilly
Garry Turkington, Hadoop Beginner's Guide (2013), Packt Publishing
Pethuru Raj et al., High-Performance Big Data Analytics (2015), Springer
Official Apache Docs: Hadoop, Pig, Hive, Kafka (2018)

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003188
Blockchain and Smart Contracts

Module profile

Exam number
5003188

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr.-Ing. Tobias Fertig

Lecturer(s)
Prof. Dr.-Ing. Tobias Fertig

Applicability	BEC, BIN, BWI, BDGD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In this module, students gain a deep understanding of blockchain technology and smart contracts. After learning the basics, students are divided into teams to develop prototypes for suitable use cases. By the end of the module, students are able to evaluate use cases and implement them in practice.

The following content is covered:
- Evaluating use cases
- How blockchains work
- How the various consensus models work
- Introduction to contract-oriented programming
- Introduction to Solidity and suitable development environments
- Introduction to programming smart contracts
- Testing and debugging smart contracts
- Common design patterns for smart contracts
- Deployment and management of smart contracts
- Basics of decentralised applications (DApps)
- Frameworks for programming DApps
- Development of DApps
- Deployment of DApps
- Testing of DApps

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
none

Learning outcomes
1. Students recall the basic concepts of blockchain technology and its functionalities.
2. Students understand the principles and functioning of smart contracts and their significance within the blockchain ecosystem.
3. Students apply the Solidity programming language to develop and implement smart contracts.
4. Students develop decentralised applications (DApps) for the Ethereum blockchain and integrate smart contracts.
5. Students analyse security vulnerabilities in smart contracts and are able to formulate and implement strategies to mitigate these risks.

Literature
https://www.rheinwerk-verlag.de/blockchain-the-comprehensive-guide-to-blockchain-development-ethereum-solidity-and-smart-contracts/

fiw.thws
Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 100000
Business Intelligence and Reporting

Module profile

Exam number
100000

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 0 hrs

Self-study: 150 hrs

Total: 150 hrs

Teaching format
Lecture

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Frank-Michael Schleif

Lecturer(s)

Applicability	BEC, BIN, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
This is a programme offered by the Virtual University of Bavaria.
Further information:
https://kurse.vhb.org/VHBPORTAL/kursprogramm/kursprogramm.jsp?kDetail=true&COURSEID=20773,84,1508,1

Recommended prerequisites for the participation in the module
This is a programme offered by the Virtual University of Bavaria.
Further information:
https://kurse.vhb.org/VHBPORTAL/kursprogramm/kursprogramm.jsp?kDetail=true&COURSEID=20773,84,1508,1

Content
This module currently replaces the 'Business Intelligence' course in the Business Technologies specialisation.
As such, it can only be selected once, either as a FWPM or (exclusively) for the 'Business Intelligence' course.
If the BT specialisation is chosen, the module is recognised as Specialisation I.

This is a course offered by the Virtual University of Bavaria. Further information:
https://kurse.vhb.org/VHBPORTAL/kursprogramm/kursprogramm.jsp?kDetail=true&COURSEID=20773,84,1508,1

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
This is a programme offered by the Virtual University of Bavaria.
Further information:
https://kurse.vhb.org/VHBPORTAL/kursprogramm/kursprogramm.jsp?kDetail=true&COURSEID=20773,84,1508,1

Literature
This is a programme offered by the Virtual University of Bavaria.
Further information:
https://kurse.vhb.org/VHBPORTAL/kursprogramm/kursprogramm.jsp?kDetail=true&COURSEID=20773,84,1508,1

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003804
Cloud Native Enterprise Java

Module profile

Exam number
5003804

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Matthias Reining

Applicability	BEC, BIN, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Programming skills in Java

Content
This course covers the fundamentals of Jakarta EE (https://jakarta.ee/), also known by its former name, Java EE (EE: Enterprise Edition).
The course focuses on the development of modern cloud-native enterprise applications, organised into the following topics:

- General requirements for business applications
- Web services (JAX-RS – RESTful web services)
- Enterprise software patterns (CDI – Context and Dependency Injection)
- Data persistence (JPA – Java Persistence API)
- Use of microservice architecture patterns (via Microprofile https://microprofile.io/)
- Different runtimes (on-premises and cloud)

The majority of the topics will be demonstrated and discussed directly using source code and live-coding examples.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- Distinguish between terms such as Java, Java EE and Jakarta EE, and contextualise buzzwords from the Java Enterprise world.
- to efficiently implement applications in different runtime environments based on the Jakarta EE APIs
- to design and implement microservice architectures using Jakarta EE / Quarkus
- to use Docker in the Jakarta EE / Quarkus environment
- to analyse Docker cloud deployments.

Literature
https://eclipse-ee4j.github.io/jakartaee-tutorial/
https://jakarta.ee/
https://microprofile.io/
https://www.adam-bien.com/roller/abien/

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003814
Digital Accessibility

Module profile

Exam number
5003814

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Joschi Kuphal

Applicability	BEC, BIN, BWI, BDGD, BISD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Experience in the design and/or development of web applications (HTML, CSS, JavaScript)

Content
The event is divided into theoretical and practical sections, each with a specific focus on digital accessibility:

- Fundamentals of digital accessibility, design and development models
- Types of disabilities, assistive technologies and adaptation strategies
- Types and mechanisms of barriers, and the allocation of responsibilities
- Relevant standards, norms and legislation supporting accessibility in national and international contexts
- Strategies for implementing accessible design and development processes
- Identifying, reducing and avoiding barriers in digital media: the web, documents (e.g. MS Word, MS PowerPoint, PDF, e-books), and audiovisual media (e.g. video, audio)
- Conceptualisation, design, implementation and testing of accessible web applications
- Setting up and using screen readers and other assistive technologies

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Students are familiar with various conceptual and design approaches associated with accessibility, and understand their similarities and differences.

- They are familiar with the most common types of disability and can characterise the prevailing models of understanding in society and academia.
- They understand demographic trends and are familiar with the key statistics on disability worldwide, in Europe and in Germany.
- They can identify various types of barriers that arise when interacting with digital products. They are familiar with assistive technologies and adaptation strategies for overcoming these barriers.
- You are familiar with the standards, norms and laws relevant to accessibility at various levels (global, European, D-A-CH) and understand how they relate to one another.
- You have internalised the benefits of accessible design at a personal, societal and business level and are familiar with strategies for implementing and embedding accessibility within organisations and development processes.
- You understand the barriers that can arise in various digital media (the web, documents, multimedia systems, e-books, apps, software, terminals, etc.) and are familiar with the principles, techniques and tools for identifying, reducing and preventing barriers.
- You will have in-depth knowledge of the conception, design and implementation of accessible web applications; you will be able to evaluate such applications for accessibility and will be familiar with relevant testing tools and methods.
- You have the skills to check, assess and correct digital documents for accessibility, as well as to create accessible documents independently.
- You are familiar with the use of common screen readers on different platforms and are able to set up a suitable testing environment for assessing web and other applications.

Literature

- Alexander, Kerstin (2019) — Image & Type: Communicating Accessibly through Typography and Images, Frank & Timme
- Aubele, Tobias; Gierke, Detlef (2025) — Accessible Websites, Rheinwerk Verlag
- Kalbag, Laura (2017) — Accessibility for Everyone, A Book Apart
- Matuzović, Manuel (2024) — Web Accessibility Cookbook: Creating Inclusive Experiences, O'Reilly
- Miller, Susi (2021) — Designing Accessible Learning Content, Kogan Page
- Pickering, Heydon (2018) — Inclusive Components: The Book, Smashing
- Silver, Adam (2018) — Form Design Patterns, Smashing

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003867
E-Commerce Co-Creation Lab: UX, A11y & AI

Module profile

Exam number
5003867

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele

Applicability	BEC, BDGD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Content Engineering (E-commerce degree programme) or Human-Computer Interaction (Digital Society degree programme)

Content
The module explores the latest developments at the intersection of user experience, accessibility and artificial intelligence.

UX & AI-Driven Automation:
- Automated creation of UI components, user flows and design systems using AI.
- Prompt engineering for UX/UI designers and researchers.

Accessibility (A11y) in practice:
- Accessibility as a core feature in e-commerce systems.
- AI-assisted accessibility audits versus manual testing with assistive technologies.

Hybrid User Research Methods:
- Conducting usability tests and interviews with real target groups.
- Creating, prompting and testing with synthetic users (Synthetic Users / LLM-based user testing).
- Critically Augmented Research: Limitations, biases and validity of synthetic user testing compared to real user behaviour.

Real-World Industry Project:
- Working as part of a team to tackle a specific challenge set by an international partner company.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Practical study achievement

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
Students will be able to …
… explain and interpret the methodological differences, opportunities and limitations of data collection using real test subjects compared with synthetic user agents (LLM-based).
... understand how end-to-end design processes work and identify the role of AI automation within the individual phases (research, ideation, prototyping, evaluation).
... apply AI automation tools in a targeted manner to generate wireframes, user flows, design systems and accessible UI components in an e-commerce context.
... independently carry out both qualitative and quantitative testing with real target groups, as well as automated audits and prompts using synthetic user profiles.
... analyse complex digital interfaces for accessibility issues using manual testing methods and AI-supported analysis tools.
... critically assess the reliability, validity and ethical justifiability of AI-generated user insights in comparison with real user data, and provide well-founded recommendations for the product development process.
... weigh up the use of AI in UX design and determine where human-in-the-loop interaction remains essential.
... independently design and develop, in collaboration with international partner companies, a novel, fully accessible e-commerce concept or prototype system optimised through AI processes.

Literature
Aubele, T., & Girke, D. (2025). Accessible Websites: Fundamentals, Application, Practice. Bonn: Rheinwerk Verlag.
Gilbert, R. M. (2019). Inclusive Design for a Digital World: Designing with Accessibility in Mind. Apress.
Gu, (E.) H., Chandrasegaran, S., & Lloyd, P. (2025). Synthetic users: Insights from designers' interactions with persona-based chatbots.
Williams, M. A. (2025). Accessible UX Research. Smashing Media AG.
Mollick, E. (2024). Co-Intelligence: Living and Working with AI. Portfolio/Penguin.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003851
Ethical Hacking (Blended Intensive Program)

Module profile

Exam number
5003851

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr.-Ing. Tobias Fertig

Lecturer(s)
Prof. Dr.-Ing. Tobias Fertig, Franziska Königer

Applicability	BIN, BWI, BEC, BISD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
n/a

Recommended prerequisites for the participation in the module
Before the course unit, learners/students are expected to have a basic understanding of computer networking, Linux, programming and the fundamentals of machine learning and artificial intelligence.

Content
This intensive ethical hacking training programme focuses on ethical hacking techniques and practices. The 2025 programme is geared towards network and AI security, and typically covers topics such as attacks on AI systems, penetration testing, vulnerability assessment, IDS, packet analysis, various testing and hacking tools, and defensive strategies. Participants can expect hands-on training and real-world simulations to enhance their ethical hacking skills. Team-based learning approaches will be employed. A competition will take place at the end. By the end of the programme, participants should be equipped with the knowledge and tools required to carry out ethical hacking assessments, identify security weaknesses, and recommend solutions to strengthen cybersecurity defences.

This course will be delivered as a Blended Intensive Programme comprising several online sessions and a study trip to Kaunas, Lithuania.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
n/a

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
n/a

Learning outcomes

- The students explain the fundamental ethical and legal principles of ethical hacking and establish effective teamwork practices.
- The students justify technical findings in clear oral and written presentations for a variety of audiences.
- Students set up a controlled simulation environment (cyber range) to practise and test their skills safely.
- Students analyse full packet captures using Wireshark to identify protocols, data flows and indicators.
- Students classify common cyber security attacks and select appropriate tools for safe reproduction and analysis.
- Students design basic penetration tests and interpret IDS outputs to assess detection and response.
- Students evaluate vulnerabilities in AI systems and propose defence strategies against adversarial attacks.
- Students plan a continuous-learning roadmap, selecting tools and resources that build knowledge and self-confidence.

Literature
This will be announced during the lesson.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003827
Governance, Risk, Compliance and Ethics (FWPM)

Module profile

Exam number
5003827

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Kristin Weber

Lecturer(s)
Prof. Dr. Kristin Weber,
Prof. Dr. Markus Oermann

Applicability	BIN, BWI, BEC
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
ISM Standards & Processes

Content
Many individuals and units, both within and outside organisations, are involved in the management of information security. Governance ensures that transparency, accountability and efficiency are maintained by establishing structures, responsibilities and framework conditions, whilst safeguarding the interests of all stakeholders. This module outlines the stakeholders involved in information security management, how responsibilities are defined, how decisions are made, and how optimal conditions are created to ensure maximum information security.

The identification and assessment of IT risks helps organisations to address threats to information security in a targeted and structured manner. The risk-based approach is adopted in many ISMS (Information Security Management System) frameworks. This module covers the fundamentals of IT risk management, including measures for the identification, analysis, assessment and treatment of IT risks within a structured risk management process.

The section on ethics explains essential conceptual foundations of moral philosophy. Drawing on established schools of ethics, it examines the normative justification of (information) security as a value and a principle guiding action. The examination of models for integrating ethical considerations into development and system design processes bridges the gap to the practical application of ethical principles. In this context, issues of compliance with current data protection legislation are also of particular relevance. Following an overview of its basic structures, the focus is on the requirements for technical and organisational data protection, as well as on the enforcement of the law and the consequences of legal breaches. Finally, the fundamentals of the reformed information security legislation are explained.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon completion of the module, students will be able to:

- identify and specifically design fundamental governance mechanisms (e.g. responsibilities, guidelines, decision-making processes, bodies) in the context of information security.
- describe relevant roles and stakeholders in information security management both within and outside organisations, and outline their tasks in detail.
- explain the significance and function of IT risk management for information security and illustrate this using practical examples.
- Identify and describe the organisational framework for effective IT risk management.
- Understand, apply and document a simple, structured IT risk management process.
- Recognise ethical challenges when dealing with digital systems relevant to security and develop approaches for integrating ethical principles into work processes.
- Explain the basic structures of data protection law and answer fundamental questions regarding data protection compliance.
- Describe the key elements of information security law and assess their relevance to business practice.
- Communicate effectively with legal or regulatory experts on issues relating to data protection and information security law.
- Reflect on the interrelationships between governance, risk and compliance management, and ethics in security-critical IT environments.

Literature
Green, J.: Information Security Management Principles. 4th ed., BCS, 2024. (esp. ch. 1 to 3)
Harich, T.: IT Security Management – The Comprehensive Practical Handbook, 4th ed., mitp, 2025.
Harkins, M.: Managing Risk and Information Security: Protect to Enable. 2nd ed., Apress, 2016.
Johannsen, A.; Kant, D.: IT Governance, Risk and Compliance Management (IT-GRC) – A Competence-Based Approach for SMEs. In: HMD – Praxis der Wirtschaftsinformatik, 57, 2020, pp. 1058–1074. https://doi.org/10.1365/s40702-020-00625-8
Kersten, H. et al.: IT Security Management in accordance with the new ISO 27001 – ISMS, Risks, Key Performance Indicators, Controls. 2nd, updated edition, Springer-Verlag, 2020.
Lang, M.; Löhr, H.: IT Security – Technologies and Best Practices for Implementation in Organisations. 2nd, revised edition, Hanser, 2024.
Lewinski/Rüpke/Eckhardt (2022): Data Protection Law. 2nd edition. Munich, C.H. Beck.

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003831
Basics Consumer Psychology

Module profile

Exam number
5003831

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Juliane Richter

Applicability	BEC, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
Fundamentals of Consumer Psychology
- Introduction to consumer psychology
- Behavioural science as the basis of consumer behaviour
- Psychological models of the purchasing decision

Psychology of the purchasing decision
- Perception and attention
- Learning and memory
- Motivation and Needs
- Emotions in Consumption
- Attitudes and Attitudinal Change
- Decision-Making Processes
- Heuristics and Biases

Applied Psychology in E-commerce
- Customer Journey and Consumer Experience
- Trust in Online Retail
- Social proof and digital recommendations
- Choice architecture and nudging
- Behavioural design
- Personalisation and recommendation systems
- Conversion optimisation from a psychological perspective

Current developments
- Behavioural AI
- Social influences on purchasing decisions / social commerce
- Influencer marketing
- Neuromarketing
- Dark patterns
- Ethical and legal aspects of psychological influence

All course content is taught in a practical manner using specific examples, case studies, psychological experiments and group exercises.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Students learn about the psychological foundations of consumer behaviour in e-commerce. They gain an understanding of how perception, attention, emotions, motivation, attitudes and social influences shape purchasing decisions, and how psychological insights can be applied to design successful customer journeys.
Students acquire the ability to analyse consumer behaviour on a sound scientific basis, to critically evaluate current developments and to apply psychological principles to specific issues in digital commerce. In doing so, they examine both the opportunities and the ethical limitations of applying psychological insights.

1. Students understand the psychological foundations of consumer behaviour.
Students are familiar with the key psychological processes of information processing and understand their influence on purchasing decisions. They are familiar with fundamental models of consumer psychology and their significance for e-commerce.
Students can explain the psychological mechanisms behind purchasing decisions and provide scientific justifications for different behaviours.
Students learn to interpret psychological models and apply them to questions of consumer behaviour.

2. Students can apply psychological insights to purchasing decisions in e-commerce.
Students understand how perception, attention, emotions, motivation, attitudes, as well as heuristics and cognitive biases influence consumer behaviour.
They can identify and evaluate psychological influencing factors in digital customer journeys and derive appropriate measures to optimise purchasing decisions.
Students apply psychological models to real-world issues in online retail and analyse existing digital applications.
They present their analyses clearly and discuss different approaches to solutions in a well-reasoned manner.
As part of practical case studies, students work together to develop recommendations for action for businesses.
Personal competence
Students critically reflect on their own consumer decisions and develop an awareness of psychological influence mechanisms in everyday life.

3. Students understand the application of psychological insights throughout the customer journey.
Students are familiar with the key psychological influencing factors in digital purchasing decision-making processes and understand their significance for customer experience, conversion and customer loyalty.
They are able to assess psychological design options for various touchpoints and identify potential for optimisation.
Students analyse online shops, apps and digital platforms using psychological criteria and derive recommendations for action.
They develop the ability to independently apply psychological insights to new digital fields of application.

4. Students engage critically with current developments in consumer psychology.
Students are familiar with current trends and developments in consumer psychology within digital retail, particularly in the areas of personalisation, artificial intelligence, behavioural design, social commerce and digital decision architectures.
They can scientifically contextualise new developments, assess opportunities and risks, and reflect on ethical issues.
Students learn to critically analyse current research findings and assess their practical relevance.
Students reflect on their own role as consumers, as well as the societal implications of psychological influence in digital commerce.

Literature

Felser, G. (2007). Advertising and Consumer Psychology. Heidelberg: Spektrum Akademischer Verlag.
Kirchler, E. M. (1995). Economic Psychology. Foundations and Fields of Application of Economic Psychology. Göttingen: Hogrefe.
Kroeber-Riel, W. (1992). Consumer Behaviour. Stuttgart: Vahlen.
Mattenklott, A. (2007). Emotional Advertising. In K. Moser (Ed.), Business Psychology (pp. 85–106). Heidelberg: Springer.
Moser, K. (2002). Market and Advertising Psychology. A Textbook. Göttingen: Hogrefe.
Neumann, P. (2013). Handbook of Market and Advertising Psychology. Bern: Huber.
Petty, R. E. & Cacioppo, J. T. (1986). Communication and Persuasion: Central and Peripheral Routes to Attitude Change. New York: Springer.
Wänke, M., & Florack, A. (2007). Brand Management. In K. Moser (ed.), Business Psychology (pp. 108–127). Heidelberg: Springer
Wolfgang Stroebe, Klaus Jonas, Miles R. C. Hewstone (eds.): Social Psychology. An Introduction (Original title: *Introduction to Social Psychology*, translated by Matthias Reis and Klaus Jonas). 6th edition, Springer, Berlin 2014

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003869
Media and Communication Psychology: The Magic of Media & Entertainment

Module profile

Exam number
5003869

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Nayomi Polcar

Applicability	BEC, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
None

Recommended prerequisites for the participation in the module
None

Content
Why do we keep scrolling even though we should have been asleep ages ago? Why do characters in TV series sometimes feel almost like real people? How do advertising, games, social media, AI and robots influence the way we think, feel and behave?
In this seminar, we take a scientific look at the psychological magic of media and communication: from entertainment, identity and emotions to persuasion, mass communication and digital platforms. We combine theories and research with examples from films, TV series, games, social media, advertising and human-technology interaction. The focus is on why media has an impact, why communication is never neutral, and how all of this affects us.

Media and communication psychology deals with traditional media such as radio, music, TV, streaming and books, as well as digital and interactive forms of media, including online and mobile communication, social media, games, computer-mediated communication, robots and new developments in media technology. It examines human behaviour, thought, emotion, action and communication in the context of media use, media experience and communication processes.

The module covers key methods in media and communication psychology, the motivations behind media selection, processes of media reception, and the effects of media and communication offerings. It also explores the individual contexts of communication: Why do people communicate? How do they perceive messages? And how do communication and the media influence our experiences, behaviour and social environment?
The aim of the module is to impart the psychological foundations of media use and communication and to apply them to key issues relating to media selection, media reception, media effects and mass communication. Students are introduced to theoretical approaches in media and communication psychology and explore motives such as entertainment, identity formation, social connection, the need for information, persuasion and emotional regulation.

Particular emphasis is placed on methods from media psychology and communication psychology, such as experimental designs,

reception studies, impact research and the analysis of communicative phenomena. In addition, current topics such as media addiction, algorithm-driven content, digital platforms, communication in advertising, computer-mediated communication and human-technology interaction are covered.
Entitled ‘Media and Communication Psychology: The Magic of Media & Entertainment’, the seminar combines a scientific foundation with illustrative examples from films, TV series, games, social media, advertising and digital communication. Students learn to critically assess media and communication phenomena and analyse them from a psychological perspective.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
None

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
None

Learning outcomes
Upon successful completion of the module, students will be able to:

- describe which traditional, digital and interactive forms of media are examined in media and communication psychology.
- explain how cognitive, emotional, social and motivational processes influence media usage and communication behaviour.
- analyse which individual and situational factors contribute to the selection of specific media formats, forms of communication and messages.
- apply theoretical models of media selection, media reception and communication – such as uses and gratifications, mood management or persuasion theories – to specific media phenomena.
- classify phenomena of mass communication and their psychological mechanisms of action.
- Assess the psychological effects of media consumption and media-mediated communication, for instance in social media, games, streaming services, advertising or computer-mediated communication.
- Reflect on how media experiences and communication processes contribute to identity formation, social orientation, emotional regulation and opinion formation.
- Develop their own research questions or study designs relating to the effects of media and communication.
- Discuss current media developments, such as algorithm-driven content, digital platforms, robots or human-technology communication, from a psychological perspective.

Literature
Wulf, T., Naderer, B., & Rieger, D. (2023). Media Psychology. Nomos.
Hennighausen, C., Lange, B. P., & Schwab, F. (2024). Evolutionary Media Psychology. In M. Hammerl, S. Schwarz & K. P. Willführ (Eds.), Evolutionary Social Sciences. A Survey (pp. 83–102). Springer VS. https://doi.org/10.1007/978-3-658-41860-7_5
Trepte, S., Reinecke, L., Gimmler, R., Gleich, U., Winter, S., Frischlich, L., Krämer, N., Appel, M., Hutmacher, F., Mengelkamp, C., Stein, J.-P., & Weber, S. (2023). Career paths in media psychology. University of Hohenheim. https://doi.org/10.18724/001c.81580
ZHAW Zurich University of Applied Sciences. (2023). JAMESfocus 2023: Mobile phone usage and sustainability – current trends. https://www.zhaw.ch/storage/psychologie/upload/forschung/medienpsychologie/james/2023/JAMESfocus_Nachhaltigkeit_Bericht_D.pdf

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Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003170
Project Management and Strategic Management

Module profile

Exam number
5003170

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Eva Wedlich

Lecturer(s)
Prof. Dr. Eva Wedlich,
Manuela Ziegler

Applicability	BEC, BIN, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
'IT Project Management' or 'Project Management' and 'Fundamentals of Economics' or 'Fundamentals of Business Administration'

Content
This course consists of a two-day 'Project Management' simulation (SysTeams by RIVA) and a two-day 'Strategic Management' simulation (Global Strategy).
Structure:
I. Introduction to FWPM (organisational aspects),

II. Part 1: Block session 'Project Management'

Content: Project management simulation game using SysTeamsProject by Riva.
The simulation game models a project management process from initial contact with the client through to successful project completion. Working in small teams, participants define, plan and manage the project and implement it themselves. Numerous project management tools are available to facilitate effective planning, e.g.:

- Objectives plan
- Project structure plan
- Milestone plan
- Gantt chart
- Project reports
- Risk analyses

The project is divided into several phases, during which participants must tackle various project management tasks and work packages whilst taking available resources into account.

III. Introduction to 'Strategic Management'

IV. Part 2: Block course 'Strategic Management'

Content: Global Strategy is an intensive general management simulation. Over the course of several rounds, participants develop a strategy for success for their company. They recognise and understand the importance of strategic management for business success and the interrelationships within business administration.

Content and programme:

- Profit and loss account, balance sheet

- Business and liquidity planning
- Costing
- Contribution margin analysis
- Cost management
- Break-even analysis
- Financing
- Marketing
- Investment analysis
- Balanced scorecard
- SWOT analysis
- Value-based corporate management
- Investment analysis
- Balanced scorecard
- SWOT analysis
- Value-based corporate management

V. Review

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes

- Students understand the principles and methods required for the effective planning and implementation of projects, as well as for the management of a

business.

- Students apply the knowledge they have learnt in realistic, simulated projects in order to gain practical experience.
- Students analyse the results of each phase of the project and each financial year to identify strengths and weaknesses.
- Students evaluate the effectiveness of the strategies implemented in project management and business leadership on the basis of the

simulation results.

- Students develop new strategies for future simulation periods, based on the insights gained from previous phases.
- Students reflect on their experiences in the business simulation games to set personal and team-related learning objectives for future challenges.

Literature
The workbook and supplementary reading material will be provided during the course.

fiw.thws
Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003871
CANVA – Smart Design: Corporate Identity & Corporate Design with AI

Module profile

Exam number
5003871

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Verena Rempel

Applicability	BEC, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
no restriction

Recommended prerequisites for the participation in the module
Your own laptop, installation of the Pro version or trial access to the CANVA programme.

Content
This FWPM guides you step by step from the basics to a finished design in Canva. The FWPM is aimed at students with no prior design experience who are looking to get started in the world of visual branding.

Students will learn how to use
the design software Canva confidently in the following areas: Creating social media content
Branding and brand management, colour management and the impact of colour, typefaces and typography, photo editing, graphics, video, Reels, Stories, and the creation of digital and print media such as leaflets, job applications, CVs, business cards, posters, presentations, websites and much more, including with the help of Canva's own AI tools.

Content:

1. Corporate Identity – Strategy
Understanding key terminology
CI, CD, brand
Best-practice examples from various industries, analysis of international brands
Positioning, brand values
Mission & vision
Identity models (e.g. Golden Circle)
Target audience profile (e.g. persona)
Brand personality (mood board, archetype)
Tone and style of language

2. Corporate Design – Visual
Deriving a design system
From brand essence to visual system (designing with Canva)
Logo, colour palette, typography, visual language
Layout principles (grid, white space, composition)

3. Brand development
Creating social media content for the brand

Colour management and colour psychology
Fonts and typography
Photo editing, graphics
Video, Reels, Stories

Developing a brand universe:
Creating digital and print media such as websites, social media content, audiovisual content, business cards, etc.

Use cases / Applications:
Self-employment / Freelancing: A consistent corporate identity helps to project a professional image and set you apart.
Portfolio: Having your own branding as a ‘common thread’ creates recognition and demonstrates strategic thinking.
Start-ups & student initiatives: A clear brand identity simplifies communication, fundraising and community building.
Agency work: CI/CD expertise is a key qualification for strategic design processes carried out on behalf of clients.
Research & science: Scientific projects also benefit from a coherent, understandable presence.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
Attendance is compulsory.

Learning outcomes
The aim is to design a consistent, professional brand identity for subsequent real-world application.

Upon successful completion of the course, students will be able to:

Students will recall key concepts of corporate identity and corporate design.
Students understand the importance of strategic brand management for digital communication media.
Students analyse CI/CD systems in terms of target audiences, differentiation and media usage.
Students evaluate design solutions in the context of user experience, media formats and communication objectives.
Students apply the knowledge they have learnt and create a complete corporate identity concept, including a cross-media design system, for their own or a fictional project.

Literature
https://www.canva.com/de_de/

fiw.thws
Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003826
Social Engineering and Security Awareness

Module profile

Exam number
5003826

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar-style instruction

Language of instruction
English

Organisation

Responsible lecturer
Prof. Dr. Kristin Weber

Lecturer(s)
Prof. Dr. Kristin Weber,
David Henkelmann

Applicability	BEC, BWI, BIN
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
The 'Social Engineering and Security Awareness' module focuses on the human factor in information security. People play a decisive role in information security within organisations through their behaviour – they are a key security factor. Because of this influence, they are increasingly targeted by cybercriminals. The module examines the human factor in information security in general and two aspects in particular: the security factor and the victim.

The Human Factor in Information Security:
- The roles of people in information security
- Insider threats
- Reasons for non-compliant behaviour

Information security awareness refers to raising employees' awareness of information security (security factor):
- Security awareness concepts and models
- Psychological understanding of awareness
- Practical examples of awareness measures
- Promoting and measuring security awareness – turning employees into security factors
- Security awareness maturity models

Social engineering is the targeted manipulation of people in order to persuade them to carry out unintentional actions (victims):
- Forms and tools of social engineering
- Psychological Tactics Used by Social Engineers
- The Social Engineering Attack Cycle, including Information Gathering
- Phishing and Phishing Simulations

The course incorporates group work and interactive elements, and provides opportunities for hands-on experience (in both attacking and defending against the human factor).

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
English

Condition for the award of credit points
none

Learning outcomes
Students view people as a solution rather than a problem for information security.
They explain the role of the human factor in information security using examples.
The students are familiar with and can identify the principles of social engineering and can explain them using examples.
They can name different forms of phishing and discuss the advantages and disadvantages of phishing simulations.
They understand what information security awareness means and are familiar with methods to enhance the various aspects of awareness.
Students can develop awareness measures in a targeted and personalised manner.

Literature
Beißel, S.: Security Awareness, De Gruyter, 2019.
Cialdini, R.: Influence – The Psychology of Persuasion, Collins Business, 2007.
Hadnagy, C. (with Schulman, S.): Human Hacking – Win Friends, Influence People, and Leave Them Better off for Having Met You, Harper Business, 2021.
Helisch, M.; Pokoyski, D. (eds.): Security Awareness – New Approaches to Successful Employee Awareness, Vieweg+Teubner, 2010.
Schroeder, J.: Advanced Persistent Training, Apress, 2017.
Verplanken, B. (Ed.): The Psychology of Habit – Theory, Mechanisms, Change, and Context, Springer, 2018.
Weber, K.: People and Information Security, Hanser, 2024.
Weber, K.; Schütz, A.; Fertig, T.: Fundamentals and Application of Information Security Awareness, SpringerVieweg, 2019.
Take Aware Sec&Life magazine, https://www.take-aware-events.com/news-post/magazinesecandlife

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003875
Teampsychology with KI

Module profile

Exam number
5003875

Duration
1 semester

Frequency
Irregular

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Christina Völkl-Wolf

Lecturer(s)
Urs Merkel

Applicability	BEC, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
In the Data-Driven Team Psychology module, students learn how to collect, analyse and interpret psychometric data points using a data-driven approach. Through People Interaction Mining, both formal and informal data sources are utilised to visualise information flows, decision-making processes and group dynamics.
A key focus is on informal social network analysis (SNA) within organisations, which serves as the basis for designing agile teams – both physically and digitally – in a data-driven manner. Students explore People Intelligence, a combination of Business Intelligence and People Analytics, to manage transformation processes within groups. Furthermore, they develop the ability to recognise psychometric patterns, analyse group dynamics in a targeted manner, and plan and implement data-driven interventions to enhance team performance.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Colloquium

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- systematically identify psychological and sociological dimensions and facets using data,
- apply methods of social network analysis and people interaction mining to group processes using appropriate (open-source) software,
- to apply People Intelligence – a combination of Business Intelligence and People Analytics – to steer data-driven transformation processes within teams,
- to analyse and understand psychometric group dynamics in agile teams and to influence them in a targeted manner through data-driven interventions,
- to evaluate the effectiveness of interventions by measuring effect sizes and to feed this back into team management.

Literature
Borgatti, S. P.; Everett, M. G.; Johnson, J. C. (2018): Analysing Social Networks. 2nd edition. SAGE Publications, London.
Pentland, A. (2014): Social Physics: How Social Networks Can Make Us Smarter. Penguin Press, New York.
Pease, A.; Pease, B. (2016): The Definitive Book of Body Language. Bantam, London.
McAfee, A.; Brynjolfsson, E. (2017): Machine, Platform, Crowd: Harnessing Our Digital Future. W. W. Norton & Company, New York.
Current academic articles and documentation will be announced during the course.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003876
General Management

Module profile

Exam number
5003876

Duration
1 semester

Frequency
Every semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr.-Ing. Anne Heß

Lecturer(s)
Patrick Kalisch

Applicability	BIN, BWI, BEC, BDGD, BISD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content
The Business Management module covers the following key topics:

1. Understanding the fundamentals of business management
- Definition and functions of business management
- Distinctions between management, leadership and organisation
- The role of business management within the overall organisational system
- Corporate objective systems: economic, social and environmental objectives
- Business management as a decision-making, control and coordination process

2. Understanding and applying corporate objectives and objective systems
- Types of objectives: substantive objectives, formal objectives and secondary/sub-objectives
- Goal hierarchies and conflicting goals
- Goal-setting within the organisation
- Operationalisation and measurability of goals
- Key-figure-based goal control

3. Understanding and applying strategic corporate management
- The concept of strategy and strategic thinking
- Analysis of the environment and the organisation
- Competitive strategies
- Growth, differentiation and cost strategies
- Strategy development, implementation and monitoring

4. Understanding and applying business management analytical tools
- SWOT analysis
- PESTEL analysis
- Industry analysis and competitive analysis
- Portfolio approaches
- Use of key performance indicators and management tools to support decision-making

5. Understanding organisational design and organisational structure
- Basic principles of organisation

- Organisational structure, functional organisation and process organisation
- Forms of organisation: functional, divisional, matrix, project and process organisation
- Advantages and disadvantages of different organisational structures
- The influence of organisational structure on leadership and communication

6. Understanding leadership styles, leadership behaviour and motivation
- The concept of leadership and leadership tasks
- Traditional and modern leadership styles
- Leadership behaviour in different business contexts
- Motivation theories, e.g. Maslow, Herzberg, Vroom
- Leading staff, delegation and feedback

7. Understanding and applying decision-making and problem-solving in management
- Decision-making processes and decision-making logic
- Rational versus intuitive decision-making
- Methods of problem analysis and creativity techniques
- Risks, uncertainty and decision quality

8. Understanding change management and organisational development
- Causes and triggers of change processes
- Phases of change processes
- Resistance to change
- Methods of organisational development

9. Understanding sustainable business management and corporate governance
- Sustainability as a management principle
- ESG criteria and social responsibility
- Corporate Social Responsibility (CSR)
- Good governance, compliance and ethical leadership
- Stakeholder engagement and long-term value creation

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Written exam (sP) according to § 23 APO

Examination - length/format
90 minutes

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
1. Fundamentals of Business Management
Students can explain the fundamental tasks, concepts and objectives of business management and contextualise their significance for the management of organisations.

2. Organisational Objectives and Objective Systems
Students can analyse different types of objectives and conflicts of interest, as well as develop and evaluate systems of objectives for organisations.

3. Strategic Management
Students can describe and contextualise strategic approaches, competitive strategies and the process of strategy development and implementation.

4. Analytical Tools in Business Management
Students can apply common analytical tools such as SWOT or PESTEL and utilise their findings to inform strategic decisions.

5. Organisational Design and Structure
Students can compare and evaluate organisational forms and structures, and apply them to practical business situations.

6. Leadership Styles, Leadership Behaviour and Motivation
Students can explain leadership styles and motivation theories, and derive measures for effective staff management.

7. Controlling and Business Management
Students can explain the functions of controlling and apply basic tools for the planning, monitoring and management of businesses.

8. Change Management and Organisational Development
Students can identify change processes, resistance and success factors in change management and derive appropriate measures.

9. Sustainable Business Management and Corporate Governance
Students can assess sustainable, ethical and governance-related aspects of business management and apply them to operational decisions.

Literature
To be announced during the course.

fiw.thws
Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6108202
Operating Shop Systems

Module profile

Exam number
6108202

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Prof. Dr. Rolf Schillinger,
Prof. Dr. Tristan Wimmer

Applicability	BEC
Semester according to SPO	7. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
120 ECTS credits, course 6102410

Recommended prerequisites for the participation in the module
Web Programming I–III, Web Application and Development Systems, Introduction to Web Technologies

Content
In this course, students explore the lifecycle of a typical e-commerce project by carrying out typical tasks throughout this lifecycle as part of group projects. These include, in particular:

- Requirements engineering
- Design of data flows and system architecture
- Project management
- Developing a strategy for measuring the success of the solution developed

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- Consistently record and present the requirements of e-commerce projects
- to develop e-commerce projects using an agile methodology
- to develop and integrate suitable logistics concepts
- to analyse and evaluate the performance of existing websites from both a business and a technical perspective

Literature
To be announced during the event

fiw.thws
Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5007212
Mobile and Ubiquitous Design

Module profile

Exam number
5007212

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Karsten Huffstadt

Lecturer(s)
Prof. Dr. Karsten Huffstadt

Applicability	BEC, BWI
Semester according to SPO	7. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
Course: Practical module; 120 ECTS credits

Recommended prerequisites for the participation in the module
none

Content
In the Mobile and Ubiquitous Design module, students develop comprehensive skills in context-sensitive interaction design. The focus is on the design of digital products and services that adapt flexibly to mobile usage scenarios and ubiquitous environments. The user-centred design process covers all relevant phases – from the analysis of the usage context, through conception and prototyping, to systematic evaluation.

Particular emphasis is placed on the visual, functional and interactive quality of the solution: at the end of the module, students create a fully clickable high-fidelity prototype that realistically simulates key interactions, interface logic and design elements. This is developed using the design tool Figma and embedded in a structured, professionally designed design booklet, which documents the usage scenario, the rationale behind the design decisions and reflections on the development process. This results in design-driven, practice-oriented solutions that are both compelling in terms of content and effectively presentable.

Specific topics covered include:
- Design principles for mobile and ubiquitous systems
- Context-sensitive interaction design (location, time, movement, environment)
- Methods of human-centred and participatory design
- UX/UI design for mobile contexts (touch, voice, responsive design)
- Wireframing, low-fidelity and high-fidelity prototyping with Figma
- Design and construction of interactive clickable prototypes
- Usability testing, user testing and feedback integration
- Documentation and visualisation of design processes (structure, style, reasoning)
- Design ethics, accessibility and data protection in ubiquitous systems
- Project work: concept development, prototyping and design brochure

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Practical study achievement

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- identify key terms, interaction patterns and technologies relating to mobile and ubiquitous systems (to remember)
- explain the specific characteristics of mobile usage contexts and their influence on design decisions (to understand)
- to apply user-centred methods (e.g. personas, scenarios, customer journeys, wireframes) in a targeted manner within the design process (to apply)
- to identify real-world usage scenarios and technical requirements and systematically translate them into design concepts (to analyse)
- to evaluate designed interaction solutions in terms of user-friendliness, context sensitivity, accessibility and feasibility (to evaluate)
- to develop context-sensitive application concepts, implement them as high-fidelity prototypes using Figma, and document them professionally in a design brochure (to create)

Literature
Rogers, Y., Sharp, H., & Preece, J. (2023). Interaction Design: Beyond Human-Computer Interaction. Wiley
Schmidt, A., & Kranz, M. (2017). Mobile Interaction. Oldenbourg
Norman, D. A. (2013). The Design of Everyday Things. Basic Books
Buxton, B. (2007). Sketching User Experiences. Morgan Kaufmann
Kuutti, K., & Bannon, L. (2014). The turn to practice in HCI: towards a research agenda. In CHI '14
Figma Design Tool: https://www.figma.com

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 6106202
Qualitative and Quantitative User Research

Module profile

Exam number
6106202

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Tobias Aubele

Lecturer(s)
Prof. Dr. Tobias Aubele,
Juliane Richter

Applicability	BEC
Semester according to SPO	7. semester
Type of module	Concentration module

Required prerequisites for the participation in the module according to the SPO
Course: Practical module; 120 ECTS credits

Recommended prerequisites for the participation in the module
User Interface Design and Usability
Online Marketing
Content Engineering
Statistics

Content
Consumer behaviour
Web analytics

Quantitative analysis
- Multivariate statistics, measures of quality
- Designing a test (questionnaire)
- Assessing reliability and validity
- Empirical evaluation of test designs

Qualitative Analysis
- Techniques of qualitative content analysis
- Quality criteria for content analysis using artificial intelligence
- Usability studies (think-aloud; guided interviews)
- Design and conduct of focus groups and interviews

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Students
... understand the theoretical foundations, methodological approaches and quality criteria (validity and reliability) of both qualitative and quantitative user research in e-commerce.
... apply qualitative methods of user research by independently designing, conducting and evaluating interviews, surveys and moderated usability studies.
... set up a fully functional web analytics and website testing infrastructure using industry-standard tools and CRM systems to collect user-centred data in compliance with data protection regulations.
.... analyse quantitative user data and website metrics by producing customised reports and applying statistical methods to test for significance.
... evaluate the qualitative and quantitative findings in the context of existing online marketing strategies, content engineering processes and UI/UX design guidelines.
... develop data-driven, well-founded recommendations for action and optimisation concepts for e-commerce processes, in order to tailor websites specifically to the needs of visitors

Literature
Kroeber-Riel, Werner; Gröppel-Klein, Andrea: Consumer Behaviour, Vahlen, 2013
Sauro, Jeff: Quantifying the User Experience: Practical Statistics for User Research, Morgan Kaufmann, 2012
Bühner, Markus: An Introduction to Test and Questionnaire Design, Pearson, 2010
Sedlmeier, Peter: Research Methods and Statistics for Psychologists and Social Scientists, Pearson, 2013
Mayring, Philipp: Qualitative Content Analysis: Fundamentals and Techniques, Beltz, 2015
Vollmert, Markus; Lück, Heike: Google Analytics: The Comprehensive Handbook. Including Google AdWords Integration and Google Webmaster Tools, Gallileo, 2014

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003873
From Software Craftsmanship to AI-powered software

Module profile

Exam number
5003873

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German/English

Organisation

Responsible lecturer
Prof. Dr. Peter Braun

Lecturer(s)
Prof. Dr. Peter Braun,
Prof. Dr. Isabel John,
Prof. Dr.-Ing. Tobias Fertig,
Christine Zilker

Applicability	BIN, BWI, BEC, BISD, BDGD
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
Modules on Programming and Software Engineering

Content
The module examines professional software development as a progression from traditional craft-based principles towards AI-supported development processes. In each thematic block, the historical foundations are first explored, such as software craftsmanship, clean code, *The Pragmatic Programmer*, complexity management, module design, and deep and shallow modules. This is followed by a discussion of the relevance these concepts will retain in a future where AI assistants generate, refactor and test code, and prepare design decisions. Students learn to critically evaluate tried-and-tested principles and apply them to modern tools such as prompt engineering, agentic coding and AI-assisted development. Guest contributions from industry highlight current and future application scenarios.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Multimedia presentation

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German/English

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- Describe key concepts and principles of software craftsmanship, clean code, pragmatic software development and AI-assisted development.
- Explain the historical evolution of professional software development, from traditional craftsmanship practices to AI-assisted development processes.
- Apply software design principles such as complexity management, modularisation, and deep and shallow modules to specific code and architectural examples.
- Analyse recommendations from *Clean Code*, *The Pragmatic Programmer* and *Software Craftsmanship* in terms of their viability, limitations and context-dependence.
- Evaluate AI-assisted development practices such as prompt engineering, code generation, refactoring support, test generation and agentic coding in terms of their risk-benefit profiles.
- Apply classic development principles to the use of AI assistants to enable better prompts, reviews, tests and design decisions.
- Develop their own approaches to professional AI-assisted software development that take into account quality standards, traceability, accountability and the critical review of generated artefacts.

Literature

- Ousterhout, John. A Philosophy of Software Design. 2nd ed., Yaknyam Press, 2021.
- Hunt, Andrew, and David Thomas. The Pragmatic Programmer: Your Journey to Mastery. 20th Anniversary Edition, Addison-Wesley, 2019.
- Mancuso, Sandro. *The Software Craftsman: Professionalism, Pragmatism, Pride*. Prentice Hall, 2014.
- Martin, Robert C. *Clean Code: A Handbook of Agile Software Craftsmanship*. Prentice Hall, 2008.
- Kuhlen, Rainer. The Consequences of Information Assistants: What Does Informational Autonomy Mean, and How Can Trust in Electronic Services Be Ensured in Open Information Markets? Suhrkamp, 1999.
- Taulli, Tom. *AI-Assisted Programming: Better Planning, Coding, Testing, and Deployment*. O'Reilly Media, 2024.
- Kofler, Michael, Bernd Öggl, and Sebastian Springer. *AI-Assisted Coding: The Practical Guide for Software Development*. Rheinwerk Computing, 2025.
- Pereira, Sergio. Generative AI for Software Development. O'Reilly Media, 2025.
- Huyen, Chip. AI Engineering: Building Applications with Foundation Models. O'Reilly Media, 2025.

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Faculty of Computer Science and Business Information Systems
Technical University of Applied Sciences Würzburg-Schweinfurt

Module: 5003834
Web-Intelligence

Module profile

Exam number
5003834

Duration
1 semester

Frequency
Every winter semester

Credit hours (SWS)
4

ECTS-Credits (CP)
5.0

Workload
Guided study time:
Presence time: 60 hrs

Self-study: 90 hrs

Total: 150 hrs

Teaching format
Seminar

Language of instruction
German

Organisation

Responsible lecturer
Prof. Dr. Rolf Schillinger

Lecturer(s)
Dr.-Ing. Benedikt Kämpgen

Applicability	BEC, BIN, BWI
Semester according to SPO	7. semester
Type of module	FWPM

Required prerequisites for the participation in the module according to the SPO
none

Recommended prerequisites for the participation in the module
none

Content

- Methods and technologies for the systematic, and as far as possible automated, collection and analysis of business-related information from the Internet, in particular from the World Wide Web
- Web Intelligence as a form of 'data discovery/acquisition via the web',
- to support better decision-making and
- to develop more useful web applications.
- Practical insights into the following topics:

– Data analytics (e.g. Pivot, OLAP, data warehousing, BigQuery),
– Web applications (e.g. low-code, AppSheet, MediaWiki),

- Data Lake (e.g. Big Data, NoSQL, Cloud, SaaS, MapReduce),
- Graph Data (e.g. Knowledge Graph, Semantic Web, Reasoning),
- Text data (e.g. natural language processing, large language models, ChatGPT),
- Internet of Things (e.g. sensors, actuators, micro:bit),
- Artificial Intelligence (e.g. machine learning, responsible AI).

Each session consists of approximately 50 per cent lecture and 50 per cent practical work.
The course content is conveyed through lectures and presentations. Students are encouraged to study the literature and engage critically with the topics.
In addition to the lecturer, up to two external speakers will give talks based on practical experience.
During the practical sessions, students will work in groups to address specific questions and analyse real-world examples. To complete the practical sessions, students must have their own laptop or one laptop per group.
Course slides, sample solutions to the practical exercises and supplementary material are made available on the THWS e-learning platform (https://elearning.fhws.de).
A portfolio assessment will be used to award credit points. Students will be set 6–8 portfolio tasks, which they may complete in 1–3-page documents by pre-determined deadlines.

Examination

Required prerequisites for the participation in the examination according to the SPO appendix
none

Examination - type
Other exam (soP) according to §§ 26, 27 APO

Examination - length/format
Portfolio

The concrete length/format of the examination will be determined in the study plan.

Language of examination
German

Condition for the award of credit points
none

Learning outcomes
Upon successful completion of the module, students will be able to:

- Identify suitable data sources and data on the web, and use analysis tools to compare data.
- Identify systems on the web and apply low-code systems to their own systems.
- Illustrate the problem of big data and apply possible solutions.
- Identify and compare text data and graph data, and demonstrate their benefits.
- To illustrate the Internet of Things.
- To apply artificial intelligence to data on the web. To discuss further use cases for artificial intelligence on the web.

Literature
Jiming Liu, Ning Zhong, Yiyu Yao, and Zbigniew W. Ras. 'The Wisdom Web: New Challenges for Web Intelligence (WI)'. Journal of Intelligent Information Systems. 2003.
Tom Heath and Christian Bizer. Linked Data: Evolving the Web into a Global Data Space. Vol. 1. Morgan & Claypool. 2011.
Sergey Melnik, Andrey Gubarev, Jing Jing Long, Geoffrey Romer, Shiva Shivakumar, Matt Tolton, Theo Vassilakis, Hossein Ahmadi, Dan Delorey, Slava Min, Mosha Pasumansky, and Jeff Shute. Dremel: A Decade of Interactive SQL Analysis at Web Scale. PVLDB. 2020.