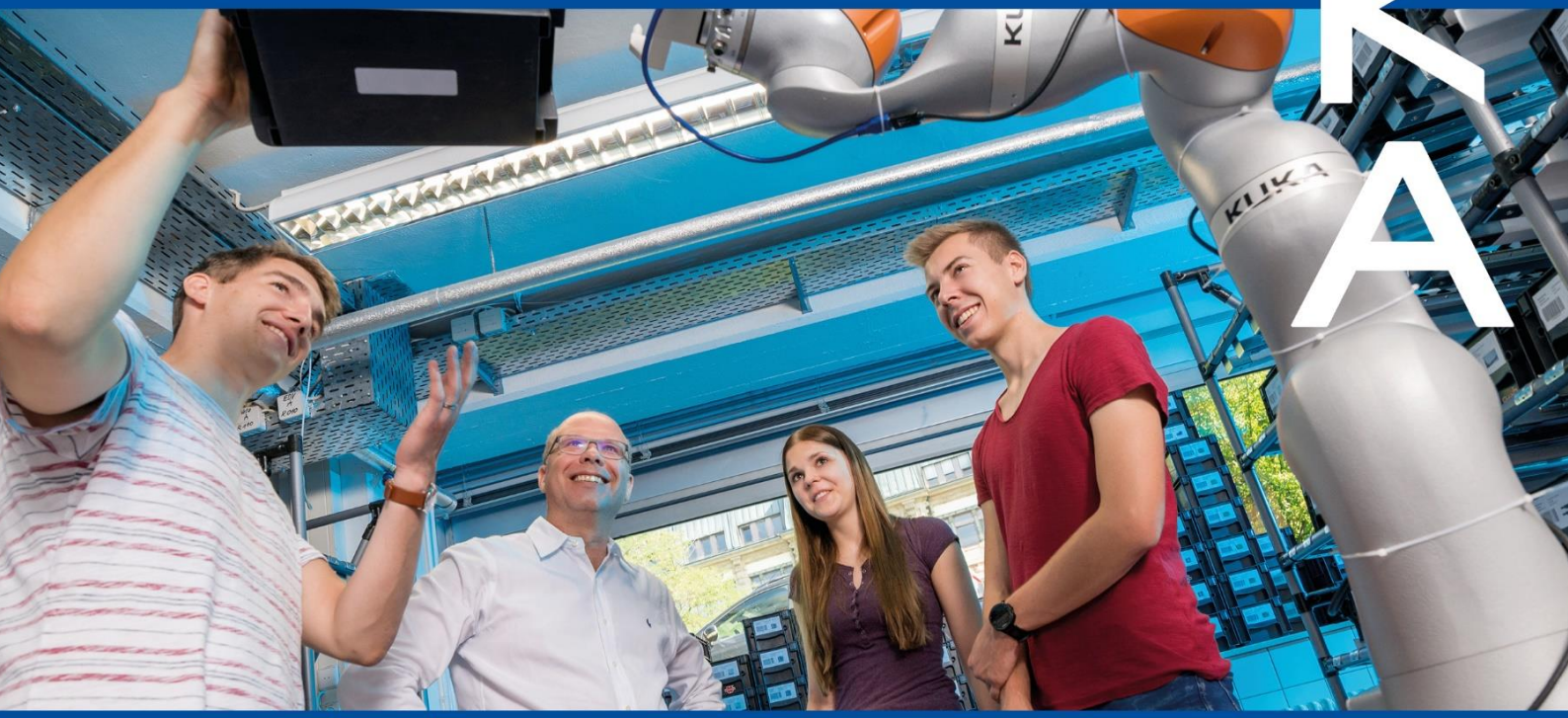
Hochschule Karlsruhe
University of
Applied Sciences

Fakultät für
Wirtschafts-
wissenschaften



Module Handbook

Industrial Engineering and Management (WINB)

Bachelor of Science

Status: 10/05/2023

Contents

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HKA

1. Semester

WINB110 Mathematics for Engineers I

WINB120 Computer Science I

WINB130 Business Law

WINB140 Technical Thermodynamics

WINB150 Economics

WINB160 General Business Administration

WINB170 Materials

WINB110 Mathematics for Engineers

Module name: *Mathematics for Engineers I*

Module overview
EDP designation: WINB110
Module coordinator(s): Prof. Dr Rainer Griesbaum (Prof. Dr Ivica Rogina)
Module scope (ECTS): 5 CP (45 hours or 65 hours if participating in the tutorial attendance events, 105 hours or 85 hours if participating in the tutorial self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students become familiar with the elementary concepts and methods of real analysis (function, continuity, differentiability and integrability, sequence, series, limit) and are able to apply these in order to recognise, systematise and independently solve mathematical problems from analysis. They are familiar with complex numbers as an extension of real numbers, can calculate with them and visualise them in the Gaussian number plane. Students become proficient in differential and integral calculus for functions with one or more real variables as a prerequisite for dealing with mathematical models in engineering and economics. They can classify differential equations and solve selected ordinary differential equations using analytical methods. Students are able to apply the mathematical tools they have learnt in analysis to engineering and economics problems in their studies. They can argue logically and rigorously in the language of mathematics and evaluate the application possibilities of analysis in their studies and in a practical context.
Examination: Written exam (90 minutes)
Usability: This module teaches the mathematical principles and methods necessary for understanding and completing successfully the subject-specific engineering and economics courses.

Course: Mathematics for Engineers I
EDP designation: WINB111
Lecturer: Prof. Dr.-Ing. Rainer Griesbaum (Prof. Dr. Ivica Rogina)
Hours per week (SWS): 4 SWS + 2 SWS voluntary tutorial
Availability: every semester
Type and mode: Lecture with tutorial (optional) / compulsory course in the WINB foundation programme
Teaching language: German
Contents:

- Fundamentals and functions (explicit and implicit representation, function properties, inverse function)
- Complex numbers (Gaussian number plane, basic arithmetic operations, exponentiation and root extraction)
- Limit values and continuity of a function and limit value (calculation rules for limit values, Bolzano's intermediate value theorem)
- One-dimensional differential and integral calculus (derivation rules, Riemann integral and antiderivative, integration methods, applications)
- Infinite series (convergence criteria, power series, Taylor series, Fourier series, applications)
- Ordinary differential equations (first and second order linear differential equations, systems of linear differential equations, applications)
- Multidimensional differential and integral calculus (partial derivative, total differential, extreme values, double and triple integral, curve integral, applications)

Recommended literature:
Papula, Lothar: Mathematik für Ingenieure und Naturwissenschaftler, Band 1 – Ein Lehr- und Arbeitsbuch für das Grundstudium. Wiesbaden: Springer Vieweg, 2014.
Papula, Lothar: Mathematik für Ingenieure und Naturwissenschaftler, Band 2 – Ein Lehr- und Arbeitsbuch für das Grundstudium. Wiesbaden: Springer Vieweg, 2015.
Rießinger, Thomas: Mathematik für Ingenieure – Eine anschauliche Einführung für das praxisorientierte Studium. Berlin, Heidelberg: Springer Vieweg, 2013.

Notes:
There is a detailed script for the lecture content with integrated exercises and detailed sample solutions. A weekly tutorial is offered parallel to the lecture. In ILIAS there is a supplementary e-learning programme, as well as a weekly exercise sheet with detailed sample solutions.

WINB120 Computer Science I

Module name: *Computer Science I*

Module overview
EDP designation: WINB120
Module coordinator(s): Prof. Dr Ivica Rogina
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students can write programmes for simple algorithmic problems by: a) Understanding how computers and programming systems work, b) Generalising tasks and describe them formally, c) finding their own solution methods on this basis and analysing their properties analyse, d) implementing solution procedures with a programming language in order to be able to develop, evaluate and use software for algorithmic problems later on and e) knowing and evaluating techniques for carrying out software development projects.
Examination: Written exam (90 minutes)
Usability: The module lays the foundations for the courses Computer Science II, Enterprise Resource Planning, AI and Machine Learning, Robot Programming, Development and Implementation, Digitalization Technologies.

Course: Computer Science I
EDP designation: WINB121
Lecturer: Prof. Dr Ivica Rogina (substitution by Profs Bauer, Nimis, Scheuermann, Wagner)
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: 1. IT computer systems (hardware, operating system, software). 2. Problems and their formal specification. 3. Types of representation and properties of algorithms. 4. Introduction to programming (data types, control structures, methods, recursion, object-orientation) 5. General data structures (e.g. Stack, queue, list, tree, graph, ...) 6. Solving concrete example problems (e.g. Sorting, organising, ...)

Recommended literature: Lecture notes, books depending on the choice of the programming language and problems worked on.
Notes: Students are expected to carry out programming exercises as part of their independent learning. Learning rooms (computer pools) are made available to them for this purpose.

WINB130 Business Law

Module name: *Business Law*

Module overview
EDP designation: WINB130
Module coordinator(s): Prof. Dr jur. Oliver Keßler
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: Basic understanding of the legal and economic order of the Federal Republic of Germany (liberal democratic basic order; social market economy)
Prerequisites according to SPO: None
Competences: The course provides an overview of the provisions of the German Civil Code (BGB) (especially the general part, law of obligations general part, law of obligations specific part) and the methods of law enforcement. By working on cases, participants will be able to categorise and solve simple situations from the field of civil and commercial law. One focus of the course is on the contracts of the German Civil Code (BGB) and the German Commercial Code (HGB) that are relevant to business life. Using practical examples, participants learn to recognise the opportunities and risks of these types of contract and to implement appropriate arrangements; references to digitalization are made and enable participants to recognise future opportunities and risks. In the area of product liability law (and beyond), they acquire the ability to secure product-specific risks under civil law and to fulfil public law requirements (e.g. in the area of data protection). Through the introductory presentation of company law, participants learn to make informed contributions to legal form decisions. Alternatively, an introduction to industrial property law is provided.
Examination: Written exam (90 minutes)
Usability:

Course: Business Law
EDP designation: WINB131
Lecturer: Prof. Dr jur. Oliver Keßler
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German
Contents: 1. Introduction

2. Introduction and overview of the BGB (AT, law of obligations general part/specific part)
3. General contract types of the German Civil Code (BGB) and the German Commercial Code (HGB) (purchase, rental, service, work and agency contracts, as well as banking and payment service contracts; commercial purchase, commission and logistics contracts)
4. Special types of contracts (in particular telecommunications, Internet and IT contracts)
5. Basics of product liability law
6. Fundamentals of company law (alternatively: fundamentals of industrial property law)

Recommended literature:

Zu 1) Horster, Detlef, Rechtsphilosophie, 2014.

Zu 2) Führich, Ernst, Wirtschaftsprivatrecht, 14. Auflage, 2022; Klunzinger, Eugen Einführung in das Bürgerliche Recht, 17. Auflage, 2019.

Zu 3 bis 5) Looschelders, Dirk, Schuldrecht Besonderer Teil, 18. Auflage, 2023.

Zu 6) Grunewald, Gesellschaftsrecht, 11. Auflage, 2020; (alternativ) Götting, Horst-Peter, Gewerblicher Rechtsschutz, 11. Auflage, 2020.

Notes:

WINB140 Technical Thermodynamics

Module name: *Technical Thermodynamics*

Module overview
EDP designation: WINB140
Module coordinator(s): Prof. Dr Marco Braun
Module scope (ECTS): 5 CP (45 hours of classroom teaching, 105 hours of self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students know the basic terms, definitions and the main theorems in the field of technical thermodynamics and can explain and apply them. They can create material and energy balances for real energy conversion processes for ideal gases, ideal fluids and solids, for real fluids with phase changes and for mixtures without chemical reactions. Students can express themselves competently in oral or written form in relation to a thermodynamic topic.
Examination: Written examination (90 minutes) or oral examination or presentation (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Technical Thermodynamics
EDP designation: WINB141
Lecturer: Prof. Dr Marco Braun (Prof. Dr Rainer Griesbaum)
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German
Contents: Imparting basic knowledge with the following focal points: • Introduction to energy balancing • Introduction of thermodynamic state variables • Thermodynamic state variables and material properties of ideal gases, ideal solids and liquids, real fluids and mixtures without chemical reactions • Balancing energy systems with the 1st law of thermodynamics • Balancing energy systems with the 2nd law of thermodynamics
Recommended literature: Günter Cerbe, Gernot Willhelms: Technische Thermodynamik, Hanser, in the latest edition.

Further literature will be announced in the lecture
Notes:

WINB150 Economics

Module name: *Economics*

Module overview
EDP designation: WINB150
Module coordinator(s): Prof. Dr Johannes Schmidt (Deputy: Prof. Dr Benjamin Kern)
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: Ability to think and formulate logically and abstractly, basic mathematical knowledge of differential calculus
Prerequisites according to SPO: None
Competences: Students will be able to systematically describe and analyse events on markets as well as macroeconomic processes and interrelationships and describe the effects of economic policy measures by: • differentiating between the various microeconomic models of market activity and selecting and solving the model relevant to the problem, • analysing the essential macroeconomic relationships with the help of a macroeconomic model, in order to understand and critically scrutinise the logic of economic decisions on the one hand and to critically evaluate economic policy measures on the other.
Examination: Written exam (90 minutes)
Usability:

Course: Economics
EDP designation: WINB151
Lecturer: Prof. Dr Johannes Schmidt
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: The principles of supply and demand: • Market and competition, supply and demand, consumers, producers and the efficiency of markets • Markets and companies: Production and production costs, costs and revenues, market forms and competition • Key economic indicators: Gross domestic product and national income, price indices, employment and unemployment

- The macroeconomic equilibrium: interplay of goods and money markets, possibilities and limitations of monetary and fiscal policy
- Employment in the overall economy: determinants of unemployment and employment, wage and price setting, inflation versus unemployment
- Current economic policy problems

Recommended literature:
Bofinger, P. (2020): Grundzüge der Volkswirtschaftslehre: eine Einführung in die Wissenschaft von Märkten (5th ed.). München: Pearson.

Notes:

WINB160 General Business Administration

Module name*: General Business Administration*

Module overview
EDP designation: WINB160
Module coordinator(s): Prof. Dr Benjamin Kern, Prof. Dr Hendrik Kunz, Prof. Dr Markus Schwarz
Module scope (ECTS): 2.5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students understand the essential basic concepts of business administration and can apply these to business management issues in the various functional areas of a company by: a. Defining technical terms, b. assigning facts to individual areas of business administration and transfer them to exemplary situations, c. knowing and applying basic procedures in business administration (especially modelling), to be able to apply this knowledge correctly and confidently in further courses and in practice.
Examination: Written exam (45 min)
Usability In this module, the essential basics of the sub-areas of business administration are presented. In the following semesters, various specialist areas of business administration are then taught on the basis of this module.

Course: General Business Administration
EDP designation: WINB161
Lecturer: Prof. Dr Benjamin Kern, Prof. Dr Hendrik Kunz, Prof. Dr Markus Schwarz
Hours per week (SWS): 2
Availability: every semester
Type and mode: Lecture/compulsory module
Teaching language: German or English
Contents: Introduction to the basics of business administration with possible specializations: • Investment and financing, • Constitutive corporate decisions, • Corporate management and service provision

Recommended literature: Balderjahn, I., Specht G. (2020): Einführung in die Betriebswirtschaftslehre, 8. Auflage, Schäffer-Poeschel Verlag. Opresnik, M., Rennhak, C. (2015): Allgemeine Betriebswirtschaftslehre, 2. Auflage, Springer Gabler Verlag Berlin. Wöhe G., Kaiser H., Döring U. (2020): Einführung in die Allgemeine Betriebswirtschaftslehre, 27. Auflage, Verlag Franz Vahlen München. Wöhe G., Kaiser H., Döring U. (2020): Übungsbuch zur Allgemeinen Betriebswirtschaftslehre, 16. Auflage, Verlag Franz Vahlen München.
Notes:

WINB170 Materials

Module name: *Materials*

Module overview
EDP designation: WINB170
Module coordinator(s): Prof. Dr Florian Finsterwalder (Prof. Dr Hendrik Rust, Prof. Dr Christoph Roser)
Module scope (ECTS): 2.5 CP (22.5 hours of attendance and 57.5 hours of self-study including exam preparation)
Classification (semester): 1st curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Competence level 1 "Knowledge": • Students can name selected representatives for typical fields of application from the superordinate material classes. Competence level 2 "Understanding": • Students can use the atomic model to explain the composition, basic structure and chemical properties of elements in order to categorise them with regard to their use. • Students will be able to explain the significance and effects of structural defects based on the internal structure and dynamic processes of metallic materials. Students will be able to illustrate the correlation with mechanical properties in order to assess the suitability for practical applications. • Students can interpret the mixing behaviour of metals using state diagrams in order to derive suitable alloys. • Students will be able to locate the most important ferrous materials in the iron-carbon diagram and select them in dependence of the requirements resulting from the application (e.g. mechanical loads, environmental conditions), • Students can derive mechanical and thermal properties from the molecular structure of polymer materials and thus select suitable plastics or organic materials depending on the application. • Students have the competence to explain relevant methods of material testing (e.g. tensile test) on the basis of physical laws as a prerequisite for meaningful practical material tests. Competence level 3 "Applying": • Students select suitable materials for functional components using their knowledge of material properties and methods of material testing. Competence level 5 "Judging":

- Students translate product requirements into material requirements as part of a product development process.
- In terms of holistic optimisation, students use further data, e.g. on production, to evaluate the utility value of materials over their life cycle with regard to costs, sustainability and footprint.

Examination:
Written exam (45 minutes)

Usability:
The module lays the foundations for the modules WINB240 Manufacturing Technology, WINB320 Electrical Engineering, WINB340 Technical Mechanics, WINB410 Engineering Laboratory

Course: Materials
EDP designation: WINB171
Lecturer: Prof. Dr Florian Finsterwalder (Prof. Dr Hendrik Rust, Prof. Dr Christoph Roser)
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German

Contents:

1. Fundamentals: composition and structure of matter
   - Periodic table of the elements
   - Bonds between atoms, crystals
   - Properties of materials (mechanical, electrical, thermal)
   - Alloy formation and state diagrams
2. Metallic materials and material behaviour
   - Ferrous materials (steel, cast iron)
   - Non-ferrous metals
3. Technical ceramics
   - Glasses
   - Technical ceramics
4. Organic materials
   - Plastics
   - Composite materials
5. Material testing and selection
   - Destructive testing
   - Non-destructive testing
   - Product life cycle and sustainability

Recommended literature:
Documents for the course (script)
These or newer editions:
Seidel, Wolfgang, 2018. Werkstofftechnik. 11. Auflage. München: Carl Hanser Verlag. ISBN 978-3-446-45415-6.
Weissbach, Wolfgang, 2012. Werkstoffkunde: Strukturen, Eigenschaften, Prüfung. 18. Auflage. Wiesbaden: Vieweg & Sohn Verlag. ISBN 978-3-8348-1587-3.

Bargel, Hans-Jürgen und Günter SCHULZE, Hrsg.,2012. Werkstoffkunde. 11. Auflage. Berlin Heidelberg: Springer Verlag. ISBN 978-3-642-17716-3. Schwab, Rainer 2011: Werkstoffkunde und Werkstoffprüfung für Dummies, Wiley-VCH Verlag, 2011.
Notes:

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wissenschaften

HKA

2. Semester

WINB210 Mathematics for Engineers II

WINB220 Computer Science II

WINB230 External Accounting

WINB240 Manufacturing Technology

WINB250 Logistics

WINB260 Marketing

WINB210 Mathematics for Engineers II

Module name: *Mathematics for Engineers II*

Module overview
EDP designation: WINB210
Module coordinator(s): Prof. Dr Susanne Kruse
Module scope (ECTS): 5 CP (45 hours or 65 hours in the case of participation in classroom exercises, 105 hours or 85 hours in the case of participation in self-study exercises including exam preparation)
Classification (semester): 2nd curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students have subject-specific mathematical knowledge and are able to: • recognise, systematise and independently solve mathematical problems in linear algebra, linear optimisation and financial mathematics by knowing the elementary concepts and methods of linear algebra, linear optimisation and financial mathematics and being able to argue with them, • know and understand the application relevance of the methods and procedures presented, • argue logically and stringently in the structured way of thinking and working that is important for studying and academic training, to be able to use the mathematical tools they have learned to analyse, model and solve engineering and economic problems in further studies and in professional practice and to justify their use.
Examination: Written exam (90 minutes)
Usability: The module serves to develop basic mathematical skills in engineering and economics degree programmes. It establishes cross-references to the application of mathematical methods in engineering and business administration as well as to professional practice. The knowledge acquired in this module is applied throughout the course and in professional practice, where situations are analysed and modelled in order to be used as a basis for decision-making.

Course: Mathematics for Engineers II
EDP designation: WINB211
Lecturer: Prof. Dr Angelika Altmann-Dieses, Prof. Dr Susanne Kruse
Hours per week (SWS): 6 SWS (4 SWS lecture + 2 SWS exercise voluntary)
Availability: every semester
Type and mode: Lecture and exercise / compulsory subject
Teaching language: German
Contents:

- Vector calculus: vector space, linear combination and basis, scalar and vector product
- Linear algebra (solution methods for linear systems of equations and matrix equations, arithmetic with matrices, quadratic matrices: orthogonality, determinants, eigenvalues and eigenvectors)
- Engineering and economic applications of matrix calculation in operations research (graphical solution of a linear optimisation problem, simplex method)
- Fundamentals of financial mathematics (interest, compound interest, amortisation)

Recommended literature (in the current edition):
Arens, T.; Hettlich, F.; Karpfinger, C.; Kockelkorn, U.; Lichtenegger, K.; Stache, H.: Mathematik, Springer.
Papula, L.: Mathematik für Ingenieure und Naturwissenschaftler, Band 1-2, Springer.
Domschke, W.; Drexl, A.: Einführung in Operations Research, Springer.
Tietze, J.: Einführung in die Finanzmathematik, Springer.

Notes:

WINB220 Computer Science II

Module name: *Computer Science II (Data Literacy)*

Module overview
EDP designation: WINB220
Module coordinator(s): Prof. Dr Nimis, Prof. Dr Wagner
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 2nd curriculum semester
Content requirements: Basic programming skills
Prerequisites according to SPO: None
Competences: The skills taught in this module are based on the competence framework of the Hochschulforum Digitalisierung (Schüller/Busch/Hindinger 2019) "Future Skills: A Framework for Data Literacy" with the competence fields (A) Establishing a data culture, (B) Providing data, (C) Evaluating data, (D) Interpreting results, (E) Interpreting data and (F) Deriving action. Students can handle data appropriately and use it in a context-related framework in line with operational objectives. In particular, they model data applications (competence B.1.1), integrate data (B.2.2) and prepare them (B.3.2) by using established concepts and modern tools of data management to create a basis for the further processing of data. On this basis, they analyse (C.1), visualise (C.2) and verbalise (C.3) data using methodical procedures to derive usable results from the data. Students interpret the results in the form of data verbalisations, visualisations and analyses (D.1, D.2, D.3) by adding and linking contextual information from application areas in order to use the results in a targeted manner for operational purposes. They act in a consistently data-driven manner (F.2) and evaluate the effects of this action (F.3) by the same means in order to enrich and correct subjective assessments with objective perspectives.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: Evidence-based technical and economic modules and specializations

Course: Data Management
EDP designation: WINB221
Lecturer: Prof. Dr Nimis, Prof. Dr Wagner
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Lecture with exercises / compulsory subject
Teaching language: German or English at the choice of the lecturer

Contents:
The course addresses the above-mentioned competences from competence area B. These are taught using common concepts and data management systems.

- Basic concepts of data management
- Data models and modelling of data
- Creating and filling data collections
- Search and find in data collections
- Provision of data in application programmes

Recommended literature (in the current edition):
Kemper/Eickler: Datenbanksysteme - eine Einführung.
Piepmeyer: Grundkurs Datenbanksysteme - von den Konzepten bis zur Anwendungsentwicklung.

Notes:

Course: Data Analytics
EDP designation: WINB222
Lecturer: Prof. Dr Nimis, Prof. Dr Wagner
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English at the choice of the lecturer

Contents:
The course addresses the above-mentioned competences from the competence areas C, D and F. These are taught using a common programming language and current standard libraries.

- Mapping of data in programming languages
- Loading and saving data
- Cleanse, prepare and link data
- Basics of data analysis, definition and interpretation of statistical key figures
- Visualisations of data and their interpretation
- Exploratory data analysis

Recommended literature:
Wes McKinney (2018): Datenanalyse mit Python: Auswertung von Daten mit Pandas, NumPy und IPython. O'Reilly.
Joel Grus (2019): Einführung in Data Science: Grundprinzipien der Datenanalyse mit Python. O'Reilly.

Notes:

WINB230 External Accounting

Module name: *External Accounting*

Module overview
EDP designation: WINB230
Module coordinator(s): Prof. Dr Katrin Haußmann, Prof. Dr Hendrik Kunz, Prof. Dr Jörg Wöltje
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 2nd curriculum semester
Content requirements: Knowledge of general business administration
Prerequisites according to SPO: None
Competences: Students master the techniques of double-entry bookkeeping and are able to prepare the annual financial statements by using numerous case studies to prepare the accounting records for more complex business transactions (especially in industrial companies) and transfer these to the corresponding balance sheet and profit and loss accounts, close accounts and develop the profit and loss account and the closing balance sheet from this. Students will later be able to analyse and evaluate the financial, earnings and asset situation of a company on the basis of the annual financial statements and discuss this competently with a tax consultant, for example. Furthermore, this lecture lays the essential foundations for further courses in the Bachelor's degree programme (in particular internal accounting, taxation, international accounting, financing and investment).
Examination: Written exam (90 minutes)
Usability:

Course: External Accounting
EDP designation: WINB231
Lecturer: Prof. Dr Katrin Haußmann, Prof. Dr Hendrik Kunz
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: Introduction to business accounting, stocktaking and inventory, double-entry bookkeeping using accounts, organisation of bookkeeping, bookkeeping in industrial companies, value added tax, depreciation and value adjustments, personnel expenses, structure and classification of annual financial statements, accounting and valuation of fixed and current assets, accruals and deferrals of expenses and income, equity, liabilities, provisions, leasing, profit and loss account, analysis of annual financial statements, additional components of

annual financial statements (notes, cash flow statement, management report, statement of changes in equity).
Recommended literature (in the current edition): Baetge, J. et al.: Bilanzen, IDW. Coenenberg, A. G. et al.: Einführung in das Rechnungswesen, Schäffer-Poeschel. Coenenberg, A. G. et al.: Jahresabschluss und Jahresabschlussanalyse, Schäffer-Poeschel. Döring U., Buchholz R.: Buchhaltung und Jahresabschluss, Erich Schmidt Verlag. Wöltje, J.: Buchführung Schritt für Schritt, utb. Wöltje, J.: Jahresabschluss Schritt für Schritt, utb. Wöltje, J.: Fit für die Prüfung: Finanzbuchführung. Wöltje, J.: Schnelleinstieg Rechnungswesen, Haufe. Latest edition in each case.
Notes:

WINB240 Manufacturing Technology

Module name: *Manufacturing Technology*

Module overview
EDP designation: WINB240
Module coordinator(s): Prof. Dr Christoph Roser
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 2nd curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students know the rules of behaviour in a production facility with regard to safety, environmental protection, product protection and dealing with employees. They can assess the manufacturing processes used in industry by recognising the processes, evaluating their advantages and disadvantages, explaining their procedures and illustrating the processes. This enables students to select suitable processes for the manufacture of products and to design production sequences. Students understand the importance of quality in manufacturing and master the basics of quality assurance. A selection of current methods and instruments of quality management, such as QFD, FMEA, SPC, Six Sigma, Kaizen, benchmarking, supplier analysis and evaluation, DIN ISO 9000/9001 ff, VDA 19 etc. are presented and analysed with regard to their range of application
Examination: Written exam (90 minutes) or oral exam (30 minutes) or term paper (in the form of a project, duration 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability: The module lays the foundations for the courses Planning and Control of Complex Logistics Networks / Digital Factory, Generative/Digital Design & Production, Automation, Digital Product Development, Operational Excellence.

Course: Manufacturing Technology
EDP designation: WINB241
Lecturer: Prof. Dr Christoph Roser
Hours per week (SWS): 4 SWS
Availability: Every semester
Type and mode: Lecture / compulsory subject
Teaching language: German
Contents: Procedure for quality management with selected methods. Behaviour in production with regard to safety, environmental protection, product safety and dealing with employees;

casting, forming, cutting, joining, coating, changing material properties; as well as other special topics in connection with production techniques.
Recommended literature: Roser, Christoph. „Fertigungstechnik für Führungskräfte. 3. überarbeitete Auflage“, 274 Seiten, AllAboutLean.com Publishing, 2022.
Notes:

WINB250 Logistics

Module name: *Logistics*

Module overview
EDP designation: WINB250
Module coordinator(s): Prof. Dr Birgit Ester and Prof. Dr Claas Christian Wuttke
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 2nd curriculum semester
Content requirements: Knowledge of general business administration
Prerequisites according to SPO: None
Competences: Students know the terminology of logistics and understand the basics of internal logistical elements, functions and processes. They are able to describe, evaluate and organise logistics functions and processes in procurement, production and distribution in a targeted manner.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: Compulsory subject also in the Business Management degree programme

Course: Logistics
EDP designation: BWLB251
Lecturer: Prof. Dr Birgit Ester and Prof. Dr Claas Christian Wuttke
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: • Introduction: Tasks and objectives of logistics • Basic logistics functions: warehousing, warehouse, inventory management, order processing, order picking, packaging, transport • Procurement logistics (stock procurement, synchronised production procurement) • Production logistics (layout planning, production planning, material flow control) • Distribution logistics (distribution systems/delivery service) • Further topics: Disposal logistics, risk management, logistics controlling
Recommended literature: Arndt, H. (2021) : Supply Chain Management: Optimierung log. Prozesse. Springer Gabler. Arnolds, H./Heege, F./Tussing, W. (2022): Materialwirtschaft und Einkauf. 14. Aufl. Springer. Corsten, H./Gössinger, R./Spengler, Th. S. (Hrsg.) (2018): Handbuch Produktions- und Logistikmanagement in Wertschöpfungsnetzwerken. De Gruyter 2018.

Ehrmann, H. (2017): Logistik. NWB
Erlach, K. (2020): Wertstromdesign: Der Weg zur schlanken Fabrik. Springer.
Furmans, K. / Kilger, Chr. (Hrsg) (2018): Gestaltung der Struktur von Logistiksytemen. Springer Viehweg.
Gudehus, T. (2012): Logistik. Grundlagen, Strategien, Anwendungen. Springer.
Gudehus, T. (2013): Logistik 2. Netzwerke, Systeme und Lieferketten. Springer.
Pfohl, H.-Chr. (2021): Logistikmanagement. 4. Aufl., Springer Viehweg.
Pfohl, H.-Chr. (2018): Logistiksysteme – Betriebswirtschaftliche Grundlagen. Springer Vieweg
Schulte, Chr. (2017): Logistik. Wege zur Optimierung der Supply Chain. 7. Aufl., Vahlen
Tempelmeier, H. (Hrsg.) (2018): Begriff der Logistik, logistische Systeme und Prozesse. Springer Gabler 2018
Ten Hompel, M. et.al. (2018): Materialflusssysteme: Förder- und Lagertechnik. Springer Viehweg
Vahrenkamp, R./Kotzab, H. (2017): Logistikwissen kompakt. 8., vollst. überarb. Aufl., De Gruyter 2017.
Weber, R. (2017): Kanban-Einführung: das effiziente, kundenorientierte Logistik- und Steuerungskonzept für Produktionsbetriebe. 9. Aufl., Expert.

Notes:

WINB260 Marketing

Module name: *Marketing*

Module overview
EDP designation: WINB260
Module coordinator(s): Prof. Dr Anna Heszler
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 2nd curriculum semester
Content requirements: None
Requirements according to SPO: None
Competences: Students can make information-based marketing decisions by using methods of situation analysis (macro and micro environment, in particular customer and purchasing behaviour) and market research. They can use approaches and models to develop a marketing strategy and implement this strategy with adequate marketing instruments by using case studies in order to actively take market and customer-oriented perspectives into account in their professional activities.
Examination: Term paper (in the form of a portfolio, duration 10 weeks) or written examination (90 minutes) or term paper (in the form of a project, duration 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability: The content of the module is congruent with the module of the same name with the module code BWLB260 in the Bachelor's degree programme in Business Management.

Course: Marketing
EDP designation: WINB261
Lecturer: Prof. Dr Anna Heszler (Deputy Prof. Dr Christian Braun, Prof. Dr Christian Seiter)
Hours per week (SWS): 4
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: • Fundamentals • Situation analysis, market research and buyer behaviour • Strategic marketing • Marketing mix: product, price, place and promotion
Recommended literature: Meffert, H./ Burmann, C./ Kirchgeorg, M./ Eisenbeiß, M. (2019): Marketing, 13. Aufl., Wiesbaden.

Kotler, P./ Armstrong, G./ Harris, L.C./ He, H. (2022): Grundlagen des Marketing, 8. Aufl., Hallbergmoos.
Homburg, C. (2016): Marketingmanagement - Strategie - Instrumente - Umsetzung – Unternehmensführung, 6. überarb. u. erw. Aufl., Wiesbaden.
Kotler, P./ Keller, K.L. / Opresnik, M.O. (2017): Marketing-Management – Konzepte – Instrumente - Unternehmensfallstudien,15. Aufl., München.

Notes:

Hochschule Karlsruhe
University of
Applied Sciences

Fakultät für
**Wirtschafts-
wissenschaften**

3. Semester

WINB3M10	Statistics (STEM Applications I)
WINB3M20	Operations Research (STEM Applications I)
WINB3M30	Enterprise Resource Planning (STEM Applications I)
WINB320	Electrical Engineering
WINB330	Internal Accounting
WINB340	Technical Mechanics

Specialization modules I and II
(modules of the specializations from page 79)

WINB3M10 Statistics (STEM Applications I)

Module name: *STEM Application I/II - Statistics*

Module overview
EDP designation: WINB3M10
Module coordinator(s): Prof. Dr Susanne Kruse, Prof. Dr Reinhard Bauer
Module scope (ECTS): 5 CP (45 hours or 65 hours in the case of participation in classroom exercises, 105 hours or 85 hours in the case of participation in self-study exercises including exam preparation)
Placement (semester): 3rd/6th curriculum semester
Content requirements: Mathematics for Engineers I and II
Prerequisites according to SPO: None
Competences: After completing the module, students have subject-specific statistical knowledge and are able to recognise, systematise and independently solve statistical problems on the basis of the methods and principles of statistics they have learned by: • calculating and interpreting the most important key figures of one- and two-dimensional measurement series and characterise the distribution of one-dimensional measurement series using graphical methods, • mastering thinking in and calculating with probabilities, • arguing confidently with random variables and their probability distributions, calculating with them and interpreting them, • knowing the most important discrete and continuous distributions and assigning them to characteristic situations, • calculating probabilities approximately in suitable situations using the central limit theorem, • Calculating estimation ranges for parameters and test hypotheses taking into account possible wrong decisions to be able to analyse, model and solve economic problems using statistical methods in the further course of studies and in professional practice and to evaluate their use in a practical context.
Examination: Written exam (90 minutes)
Usability: The module serves to develop basic mathematical skills in economics degree programmes. It establishes cross-references to the application of statistical methods in industrial engineering and professional practice. The knowledge from this module is used throughout the course and in professional practice when data is processed, analysed and used as a basis for decision-making.

Course: Statistics
EDP designation: WINB3M11

Lecturer: Prof. Dr Susanne Kruse, Prof. Dr Reinhard Bauer
Hours per week (SWS): 4 SWS + 2 SWS voluntary exercise
Availability: every semester
Type and mode: Lecture and exercise / compulsory subject
Teaching language: German
Contents: • Descriptive statistics (preparation and summarisation of data, determination of meaningful statistical key figures, histograms, box plots, empirical distribution function, correlation and linear regression), • Probability theory (combinatorics, random processes and their formal description, random variables and their distributions, determination of probability distributions, special discrete and continuous distributions and their key figures, limit theorems) • Inductive statistics (inference from the sample to the population, estimated values, confidence intervals and hypothesis tests)
Recommended literature: Bamberg, G.; Bauer, F.; Krapp, M.: Statistik-Arbeitsbuch: Übungsaufgaben - Fallstudien - Lösungen, Oldenbourg. Henze, N.: Stochastik für Einsteiger, Springer. Puhani, J.: Statistik – Einführung mit praktischen Beispielen, Springer. Wewel, M.: Statistik im Bachelor-Studium der BWL und VWL, Oldenbourg.
Notes:

WINB3M20 Operations Research (STEM Applications I)

Module name: *STEM Application I/II - Operations Research*

Module overview
EDP designation: WINB3M20
Module coordinator(s): Prof. Dr Susanne Kruse
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Placement (semester): 3rd/6th curriculum semester
Content requirements: Basic knowledge of mathematics, comparable to the modules Mathematics for Engineers I and Mathematics for Engineers II
Prerequisites according to SPO: None
Competences: Students can determine solutions for linear optimization problems, transport problems, integer and combinatorial optimisation problems and non-linear optimisation problems and interpret the results by: a) classifying practically relevant optimisation problems and transfer them into mathematical models, b) identifying suitable solution methods and algorithms and c) applying these independently to low-dimensional optimisation problems, to be able to evaluate the possible applications of mathematical optimisation methods in a practical context and assess the associated opportunities, risks and limitations.
Examination: Written exam (90 minutes)
Usability: The module serves to train basic skills in the field of mathematical optimisation in engineering and economics degree programmes. It establishes links to the application of mathematical optimisation methods in engineering and business administration as well as in professional practice. The knowledge acquired in this module is used in all areas of study and professional practice where situations are analysed, modelled and optimised in order to serve as a basis for decision-making.

Course: Operations Research
EDP designation: WINB3M21
Lecturer: Prof. Dr Angelika Altmann-Dieses, Prof. Dr Susanne Kruse
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture incl. exercise / compulsory subject as part of STEM Application I and II
Teaching language: German
Contents: • Linear optimisation: simplex algorithm, duality

- Transport problems: basic model, optimality test, stepping stone method, extensions of the basic model, reloading problem, assignment problem
- Integer optimisation: Gomory's cutting plane method
- Combinatorial optimisation: travelling salesman problems, heuristic opening methods, branch-and-bound methods
- Non-linear optimisation: without constraints (gradient method, Newton method), with constraints (SQP method)

Recommended literature (in the current edition):
Domschke, W.; Drexl, A.: Einführung in Operations Research, Springer.
Domschke, W.; Drexl, A.; Klein, R.; Scholl, A.; Voß, S.: Übungen und Fallbeispiele zum Operations Research, Springer.

Notes:
As part of the STEM Application I/II modules (WINB621), two of the following three courses must be completed: Statistics, Operations Research (OR) or Enterprise Research Planning (ERP)

WINB3M30 Enterprise Resource Planning (STEM Applications I)

Module name: *STEM Application I/II - Enterprise Resource Planning*

Module overview
EDP designation: WINB3M30
Module leader(s): Prof. Dr Bernd Scheuermann (Deputy Prof. Dr Carsten Hahn)
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Placement (semester): 3rd/6th curriculum semester
Content requirements: Successful participation in the previous courses "General Business Management", "External Accounting", "Computer Science I and II" or courses with comparable content.
Prerequisites according to SPO: None
Competences: Students will be able to use enterprise resource planning systems (ERP systems) for the (partially) automated execution of cross-departmental business processes by examining the architectures and functionalities of ERP systems, calculating with their methods of quantity-oriented planning and value-oriented billing, implementing application scenarios in a graphical process notation and independently executing integrated business processes on an ERP system provided in order to later evaluate the technical and economic potential of ERP systems, automate business processes of companies through IT-based integration in a meaningful way and thus improve the achievement of corporate goals.
Examination: Written exam (90 minutes)
Usability: The contents of this module can also be used in the modules "Economic Aspects of Digitalization", "Business Intelligence" and "Technical Systems, Components and Processes".

Course: Enterprise Resource Planning
EDP designation: WINB3M31
Lecturer: Prof. Dr Bernd Scheuermann (Deputy Prof. Dr Carsten Hahn)
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture with exercise / compulsory subject
Teaching language: German or English
Contents: Fundamentals of business information systems. Introduction to Enterprise Resource Planning (ERP). Architecture of ERP systems. ERP implementation and customizing. Introduction to SAP (company and products). Introduction to an educational model company. Navigation in the ERP software (e.g. SAP S/4HANA). Representation of organizational structures and

business processes in ERP. Management of business data in ERP systems and basics of enterprise application development. Case studies/exercises: Planning and control of operational processes from a selection of different business application areas supported by ERP, for example, accounting, logistics or human resources.
Recommended literature: C. Drumm, B. Scheuermann, and S. Weidner. Introduction to SAP S/4HANA. The official companion book based on model company Global Bike—for learning, teaching, and training. Espresso Tutorials, 2024. More literature will be announced in the lectures.
Notes:

WINB320 Electrical Engineering

Module name: *Electrical Engineering*

Module overview
EDP designation: WINB320
Module leader(s): Prof. Dr Martin Fritz (Substitute: Prof. Christian Wurll)
Module scope (ECTS): 5 CP (45 hours or 65 hours in the case of participation in the tutorial attendance events, 105 hours or 85 hours in the case of participation in the tutorial self-study including exam preparation)
Classification (semester): 3rd curriculum semester
Content requirements: Knowledge of mathematics (comparable to the modules Mathematics for Engineers I and II), basic knowledge of physics
Requirements according to SPO: None
Competences: Students will be able to analyse and design significant technical applications from the basic areas of electrical engineering by understanding and applying the fundamental electrical quantities and basic elements as well as simple dynamic processes (e.g. switching processes) and their physical relationships as well as methods such as complex alternating current calculation in order to understand and design more complex electrical networks and systems and to be able to discuss them competently with people from the electrical engineering environment later on.
Examination: Written exam (90 minutes)
Usability:

Course: Electrical Engineering
EDP designation: WINB321
Lecturer: Prof. Dr Martin Fritz
Hours per week (SWS): 4 SWS + 2 SWS voluntary tutorial
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German
Contents: • Basic concepts (charge, current, voltage, resistance, power, energy); direct current theory (simple circuits, network analysis, equivalent voltage source); • Electric and magnetic fields (physical principles, electrostatics, electromagnetism, capacitance and inductance, law of induction, motor and generator, transformer, switching processes); • Alternating current theory (calculation methodology, applications e.g. electrical filters, modulation, spectral analysis); • Semiconductor technology and signal processing (diode, transistor, digital technology)

Recommended literature: Script, textbooks: HAGMANN, Gert, 2020, *Grundlagen der Elektrotechnik,* 18. Auflage, Graz: AULA-Verlag, ISBN: 978-3-89104-830-6. HAGMANN, Gert, 2019, Aufgabensammlung zu den Grundlagen *der Elektrotechnik*, 18. Auflage, Graz: AULA-Verlag, ISBN: 978-3-89104-828-3. WIESSGEBER, Wilfried, 2018, Elektrotechnik für Ingenieure 1, 11. Auflage, Wiesbaden: Springer Verlag, ISBN: 978-3-658-21820-1. WIESSGEBER, Wilfried, 2018, Elektrotechnik für Ingenieure 2, 10. Auflage, Wiesbaden: Springer Verlag, ISBN: 978-3-658-21822-5.
Notes:

BWLB330 Internal Accounting

Module name: *Internal Accounting*

Module overview
EDP designation: WINB330
Module coordinator(s): Prof. Dr Jörg Wöltje, Prof. Dr Hendrik Kunz
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd curriculum semester
Content requirements: Knowledge of general business administration and external accounting
Prerequisites according to SPO: None
Competences: Students will be able to develop and implement an efficient cost accounting system, taking company-specific features into account, by applying basic business management and cost theory principles in order to: a) be able to carry out the structure of cost accounting as a sequence of cost recording (cost element accounting), cost allocation of overheads to the service processes (cost centre accounting) and allocation to the products/services (cost unit accounting), b) be able to perform a contribution margin calculation, interpret the individual contribution margin stages and calculate and explain the break-even point, c) be able to present and discuss the fundamental differences as well as the advantages and disadvantages of full and partial cost accounting in order to advise management on successful corporate management, prepare quotation calculations, eliminate products with negative contribution margins and increase sales of products with positive contribution margins. Students are therefore able to calculate the costs of a company's products and services, identify cost reduction potential and optimise product programmes in the short and long term in order to introduce cost reduction measures.
Examination: Written exam (90 minutes)
Usability: The module serves as a basis for further business administration courses in the Bachelor's degree programme.

Course: Internal Accounting
EDP designation: WINB331
Lecturer: Prof. Dr Jörg Wöltje
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German
Contents:

Selected topics from the following areas:

- Position of cost accounting within corporate accounting
- Basic concepts of cost accounting, cost functions, cost accounting systems
- Cost element accounting, cost centre accounting, cost unit accounting
- Current income statement
- Full and partial cost accounting systems
- Partial cost accounting (single-stage and multi-stage contribution margin accounting)
- Standard costing systems

Recommended literature:

Coenenberg, A., Fischer, T., Günther T.: Kostenrechnung und Kostenanalyse, 9. Aufl., Stuttgart 2016.
Friedl, G., Hofmann, C., Pedell, B.: Kostenrechnung – Eine entscheidungsorientierte Einführung, 4. Aufl., München 2022.
Schmidt, A.: Kostenrechnung, 9. Aufl., Stuttgart, 2022.
Wöltje, J.: Kosten- und Leistungsrechnung, 3. Aufl., 2022.
Wöltje, J.: Schnelleinstieg Rechnungswesen, 2. Aufl., 2017.
Wöltje, J.: Betriebswirtschaftliche Formelsammlung, 7. Aufl., 2020.

Notes:

WINB340 Technical Mechanics

Module name: *Technical Mechanics*

Module overview
EDP designation: WINB340
Module coordinator(s): Prof. Dr Rainer Griesbaum (Prof. Dr Florian Finsterwalder)
Module scope (ECTS): 5 CP (45 hours or 65 hours in the case of participation in the tutorial attendance events and 105 hours or 85 hours in the case of participation in the tutorial self-study including exam preparation)
Classification (semester): 3rd curriculum semester
Content requirements: Knowledge of mathematics analogue to the modules Mathematics for Engineers I and II
Prerequisites according to SPO: None
Competences: Students can isolate components from their surroundings (cut them free) and describe their external load with forces and moments. Using an equilibrium analysis, they can determine the static load on components due to internal forces and moments and convert these into stresses and deformations. Students can describe the movement of a mass point and make statements about the cause or effect of the movement. They can select a suitable coordinate system and mathematically formulate the basic kinematic variables (position, speed, acceleration) and convert them into each other. They can balance forces, energy, momentum and angular momentum for the mechanical system and characterise the type of movement. Students are able to map real-world problems in statics onto simplified mechanical models. They can carry out the necessary abstraction and estimate and appropriately model external loads. This enables them to recognise and apply basic mechanical principles for elementary applications of statics and to check compliance with permissible stresses and deformations. Students can map real technical systems to the physical models of mass point kinetics. Using the mathematical methods taught, they can estimate the forces, accelerations and speeds that occur in real operation for simple technical systems. They are able to draw qualitative and quantitative conclusions that are relevant for the design of a technical system or for analyses during operation.
Examination: Written exam (90 minutes)
Usability:

Course: Technical Mechanics
EDP designation: WINB341
Lecturer: Prof. Dr.-Ing. Rainer Griesbaum (Prof. Dr. Florian Finsterwalder)
Hours per week (SWS): 4 SWS
Availability: every semester

Type and mode: Lecture (4 SWS) with 2 SWS tutorial (voluntary) / compulsory subject in the main study programme WINB

Teaching language: German

Contents:

Statics

- Concept of force, rigid body, principle of section, composition and decomposition of forces, equilibrium in the central force system
- Pair of forces, free moment and displacement moment, equilibrium in the general force system
- Forces and moments in bearings and joints, static determination
- Internal forces in the beam

Strength of materials

- Stress state, stress tensor, principal stresses, Mohr's stress circle, distortion state, distortion tensor, law of elasticity
- Tension and compression in beams, beam bending, beam model, area moment of inertia, pure bending, straight bending, bending line
- Statically overdetermined systems

Kinetics of the mass point

- Cartesian and polar coordinate system, translation and rotation
- Velocity, acceleration, angular velocity, angular acceleration
- Axioms of Newtonian physics, Newton's fundamental law, constraining forces, impressed forces, equation of motion
- Law of work, law of energy, law of momentum, law of angular momentum

Recommended literature:

Gross, D. u. a.: Technische Mechanik 1 – Statik. Berlin, Heidelberg: Springer, 2019.
Gross, D. u. a.: Technische Mechanik 2 – Elastostatik. Berlin, Heidelberg: Springer, 2017.
Gross, D. u. a.: Technische Mechanik 3 – Kinetik. Berlin, Heidelberg: Springer-Verlag, 2019.
Hibbeler, R. C.: Technische Mechanik 1 – Statik. München: Pearson Studium, 2018.
Hibbeler, R. C.: Technische Mechanik 2 – Festigkeitslehre. München: Pearson Studium, 2013.
Hibbeler, R. C.: Technische Mechanik 3 – Dynamik. München: Pearson Studium, 2012.
Riemer, M. u. a.: Mathematische Methoden der Technischen Mechanik. Wiesbaden: Springer Vieweg, 2019.

Notes:

There is a detailed script for the lecture content with integrated exercises and detailed sample solutions. A weekly tutorial is offered parallel to the lecture. In ILIAS there is a supplementary e-learning programme, as well as a weekly exercise sheet with detailed sample solutions.

Hochschule Karlsruhe
University of
Applied Sciences

Fakultät für
Wirtschafts-
wissenschaften

4. Semester

WINB410 Engineering Laboratory

WINB420 Financing and Investment

WINB430 Value Creation Excellence

WINB440 Control Engineering

Specialization modules III and IV
(modules of the specializations from p. 79)

WINB410 Engineering Laboratory

Module name: Engineering Laboratory

Module overview
EDP designation: WINB410
Module leader(s): Prof. Dr. Harald Sehr (Substitute: Prof. Christian Wurll)
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 4th curriculum semester
Content requirements: Knowledge of electrical engineering, technical mechanics, computer science, technical thermodynamics (comparable to the modules of the same name), basic knowledge of physics.
Prerequisites according to SPO: None
Competences: Students can understand typical engineering issues and evaluate and implement practical solutions by analysing the problems with the engineering approaches learned in theory and applying the known methods in order to later assess typical engineering challenges from a practical point of view (such as tolerances, measurement errors, etc.) and to be able to discuss them competently with people from the engineering environment.
Examination: Coursework (not graded): One lab report for each experiment to be carried out, to be handed in one week after the end of the respective experiment. Appropriate preparation is required for admission to the individual experiments, which is checked in a short oral discussion before or at the beginning of the experiment (presentation 5 minutes).
Usability:

Course: Engineering Laboratory
EDP designation: WINB411
Lecturer: Prof. Dr. Harald Sehr
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Laboratory / compulsory subject
Teaching language: German
Contents: In the practical course, selected experiments from the fields of engineering such as electrical engineering, mechanics, production and materials, automation, control engineering, thermodynamics and robotics are to be carried out independently. Typical procedure for each experiment: preparation of the experiment (self-study on the basis of experiment instructions), performance of the experiment (in the laboratory), experiment report.
Recommended literature:

Lecture notes of the modules mentioned under "Content requirements" and/or comparable literature.
Notes: The engineering laboratory is only considered successfully completed if the preparation of the experiment, the execution of the experiment and the written experiment report have been successfully completed on time for each experiment. The coursework must be completed within the semester.

WINB420 Financing and Investment

Module name: *Financing and Investment*

Module overview
EDP designation: WINB420
Module coordinator(s): Prof André Wölfle
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 4th curriculum semester
Content requirements: Knowledge of general business administration, external accounting, internal accounting
Prerequisites according to SPO: None
Competences: Students can collect and structure decision-relevant data and carry out investment calculations by assessing the suitability of various investment calculation methods depending on the type of decision situation and applying them in order to make model-based investment decisions. The liquidity and capital requirements of a company can be recorded and analysed by using analytical tools to decide on suitable forms of financing and to design the liquidity and capital structure of a company.
Examination: Written exam (90 minutes)
Usability:

Course: Financing and Investment
EDP designation: WINB421
Lecturer: Prof. André Wölfle
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: Static and dynamic investment calculation methods, inclusion of debt financing and RE taxes. Decision on useful life and replacement date. Leverage effect, equity and debt financing, internal and external financing, credit substitutes, capital requirements, cash flow and cash flow statement, financial ratios, company valuation, shares, capital increase, financial derivatives, bonds, rating, FinTech, behavioural finance.
Recommended literature: Bieg, H.; Kußmaul, H.: Investition, Finanzierung, 3. Auflage, München 2016. Blohm, H.; Lüder, K.; Schäfer, Ch.: Investition, 10. Auflage, München 2012. Bösch, M.: Finanzwirtschaft, 5. Auflage, München 2022. Kruschwitz, L.; Lorenz, D.: Investitionsrechnung, 15. Auflage, München 2019.

Perridon, L.; Steiner, M.; Rathgeber, A.: Finanzwirtschaft der Unternehmung, 17. Auflage, München 2016.
Wöhe, G.; Bilstein, J.; Ernst, D.; Häcker, J.: Grundzüge der Unternehmensfinanzierung, 11. Auflage, München 2013.
Wöltje, J.: Investition und Finanzierung, 3. Auflage., Freiburg 2022.
Brealey, R.; Myers, S.; Allen, F.: Principles of Corporate Finance, 13 Ed., New York 2019, McGraw-Hill.
Ross, S.; Westerfield, R.; Jordan, B.: Fundamentals of Corporate Finance, 13 Ed., New York 2022, McGraw-Hill.

Notes:

WINB430 Value Creation Excellence

Module name: Value Creation Excellence
EDP designation: WINB430
Module coordinator(s): Prof. Dr Birgit Ester, Prof. André Wölfle
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 4th curriculum semester
Content requirements: Knowledge of logistics, general business administration, external accounting, comparable to the corresponding modules
Prerequisites according to SPO: None
Competences: Students can record, separate, differentiate and depict value creation processes (flows of goods, information and finance) using methods, procedures, modelling and the inclusion of existing assessment indicators in order to design them effectively and efficiently in industry, trade and services and to increase or optimise their performance as key competitive factors.
Examination: Written exam (90 minutes)
Usability:

Course: Value creation excellence
EDP designation: WINB431
Lecturer: Prof. Dr Birgit Ester
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: Value-added processes: Procurement, service production, sales, supplementary services and after-sales (incl. spare parts management); planning, design, control and optimisation of value creation processes (processes, methods, key figures, information supply, financial level); consideration of various industries and use cases. Depending on the degree programme, the focus of content is differentiated.
Recommended literature: Will be announced at the beginning of the lecture.
Notes:

Course: Value creation excellence
EDP designation: WINB432
Lecturer: Prof. André Wölfle
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: Value-added processes: Procurement, service production, sales, supplementary services and after-sales (incl. spare parts management); planning, design, control and optimisation of value creation processes (processes, methods, key figures, information supply, financial level); consideration of various industries and use cases. Depending on the degree programme, the focus of content is differentiated.
Recommended literature: Will be announced at the beginning of the lecture.
Notes:

WINB440 Control Engineering

Module name: *Control Engineering*

Module overview
EDP designation: WINB440
Module leader(s): Prof. Dr Martin Fritz
Module scope (ECTS): 5 CP (45 hours or 65 hours in the case of participation in the tutorial attendance events, 105 hours or 85 hours in the case of participation in the tutorial self-study including exam preparation)
Classification (semester): 4th curriculum semester
Content requirements: Knowledge of electrical engineering and mathematics (comparable to the modules Electrical Engineering and Mathematics for Engineers I and II), basic knowledge of physics
Prerequisites according to SPO: None
Competences: Participants will be able to analyse dynamic systems and develop control loops by assessing and applying the associated methods of Laplace transformation, transfer function, controller-, design- and optimisation methods in the time, the frequency and the image domain in order to successfully investigate, evaluate, solve and optimise complex and unfamiliar problems in the fields of control engineering, system dynamics and system identification.
Examination: Written exam (90 minutes)
Usability:

Course: Control engineering
EDP designation: WINB441
Lecturer: Prof. Dr Martin Fritz (Substitute: Prof. Björn Hein)
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German
Contents: Active circuit diagram, control loop elements, controlled system, controller, time behaviour, frequency behaviour, Laplace transformation, transfer function, complex frequency response, linear control loop, controller design methods, investigation of stability, optimisation methods.
Recommended literature: Script, textbooks: A. Böttiger, Regelungstechnik; Oldenbourg. (current edition in each case). H. Unbehauen, Regelungstechnik 1 und 2. (both current editions). J. Lunze, Regelungstechnik 1 und 2. (current editions)

Mann, Schiffelgen, Froriep, Einführung in die Regelungstechnik. (current edition in each case). G. Schulz, Regelungstechnik 1, Oldenbourg Lehrbücher für Ingenieure, 2007. Otto Föllinger, Regelungstechnik, Einführung in die Methoden und ihre Anwendung 2016.
Notes:

Hochschule Karlsruhe
University of
Applied Sciences

Fakultät für
Wirtschafts-
wissenschaften

5. Semester

WINB510 Internship Preparation

WINB520 Internship

WINB510 Internship Preparation

Module name: Internship Preparation

Module overview
EDP designation: BWLB510
Module coordinator(s): Prof. Dr Jörg Wöltje
Module scope (ECTS): 5 CP (45 hours of attendance, 105 hours of self-study including workload for the preparation of the preliminary examination)
Classification (semester): 5th curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students are able to carry out a self-reflection and analysis and use this to create a suitable application, i.e. search, cover letter and CV, in order to find a suitable internship position in Germany or abroad in the following semesters. They evaluate the strengths and weaknesses of previous application documents and design suitable improvement measures in order to be successful in their internship search.
Examination: Academic achievement, the specific form of the academic achievement will be announced at the beginning of the course.
Usability: Application for the internship semester

Course: Practical preparation
EDP designation: WINB511
Lecturer: Prof. Dr Stefan Bleiweis
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Seminar / compulsory subject
Teaching language: German or English
Contents: • Teamwork: process design, feedback, core teamwork. • Application process: literature research, self-analysis, job search, preparation of an application portfolio with cover letter and CV, applicant training with presentation, interview, follow-up and negotiation, recruitment tests, assessment and case studies, employment contracts and working abroad, leaving the company: Job references, references, maintaining contacts at home and abroad. • Project work and role plays: Present results in small groups
Recommended literature: Hesse/Schrader: Die perfekte Bewerbungsmappe für Hochschulabsolventen, Eichborn Hesse/Schrader: Das Bewerbungshandbuch, Eichborn. Miriam Naficy: The fast track, Broadway books.

Always in the current edition.
Notes: Attendance is compulsory for all practical preparation sessions.

WINB520 Internship

Module name: Internship

Module overview
EDP designation: WINBB520
Module coordinator(s): Prof. Dr Jörg Wöltje
Module scope (ECTS): 25 CP (750 hours of practical work and preparation of practical report)
Classification (semester): 5th curriculum semester
Content requirements: None
Requirements according to SPO: None
Competences: In the internship semester, students apply and deepen the business management knowledge they have acquired during their studies by working as independently as possible on business management tasks in a company. They are able to work in typical fields of work and application for business managers and reflect on and evaluate the experience gained during their practical work. Students learn about various aspects of operational decision-making processes and their interaction within an organisation. They will also gain in-depth insights into business management, organisational and social contexts in organisations. They should be able to question and analyse the knowledge gained. Students will reflect on the skills they have acquired in business practice and summarise these.
Examination: Academic achievement: Practical work, at least 95 attendance days Practical report comprises at least 30 pages: The practical report must be submitted no later than 28 days after the end of the practical phase. The practical semester report should include: • a brief introduction to the internship company, • the results-orientated description of the planning and implementation of the activities performed, • the scientific presentation of the knowledge and skills acquired and the experience gained.
Usability:

Course: Practical work
EDP designation: WINB521
Lecturer: Prof. Dr Stefan Bleiweis
Hours per week (SWS):
Availability: every semester
Type and mode: Practical work / compulsory subject
Teaching language: German or English
Contents:

The pre-selection (and approval) of the practical placement, regular contact with the supervising staff in the organisations and ongoing supervision by a professor during the practical activities ensure that the students gain a good insight into the business and organisational contexts of an organisation through qualified cooperation. Students must prepare a written report on their training during the internship semester. This must respect a specified form and clearly show that the required content and activities were actually carried out in practice. The report must be supplemented by a record of activities/certificate from the company, which shows the type and content of the activities, the start and end of the internship period and any absences.
Recommended literature:
Notes: The internship semester is only considered successfully completed if the internship preparation, the internship and the written internship report have been successfully completed on time.

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6. Semester

WINB3M10	Statistics (STEM Applications II)
WINB3M20	Operations Research (STEM Applications II)
WINB3M30	Enterprise Resource Planning (STEM Applications II)
WINB620	Computer Applications in Development and Production
WINB630	Scientific Seminar
WINB640	Project Seminar
WINB650	Elective Subject I
WINB660	Elective Subject II

WINB3M10 Statistics (STEM Applications II)

Module name: *STEM Application I/II - Statistics*
Module overview
EDP designation: WINB3M10
Module coordinator(s): Prof. Dr Susanne Kruse, Prof. Dr Reinhard Bauer
Module scope (ECTS): 5 CP (45 hours or 65 hours in the case of participation in classroom exercises, 105 hours or 85 hours in the case of participation in self-study exercises including exam preparation)
Placement (semester): 3rd/6th curriculum semester
Content requirements: Mathematics for Engineers I and II
Prerequisites according to SPO: None
Competences: On completion of the module, students have subject-specific statistical knowledge and are able to recognise and systematise statistical problems and solve them independently on the basis of the methods and principles of statistics they have learned by: • Calculating and interpreting the most important key figures of one- and two-dimensional measurement series and characterise the distribution of one-dimensional measurement series using graphical methods, • mastering thinking in and calculating with probabilities, • arguing confidently with random variables and their probability distributions, calculating with them and interpreting them, • knowing the most important discrete and continuous distributions and assigning them to characteristic situations, • calculating probabilities approximately in suitable situations using the central limit theorem, • Calculating estimation ranges for parameters and test hypotheses taking into account possible wrong decisions in order to be able to analyse, model and solve economic problems using statistical methods in the further course of studies and in professional practice and to evaluate their use in a practical context.
Examination: Written exam (90 minutes)
Usability: The module serves to develop basic mathematical skills in economics degree programmes. It establishes cross-references to the application of statistical methods in industrial engineering and professional practice. The knowledge from this module is used throughout the course and in professional practice when data is processed, analysed and used as a basis for decision-making.

Course: Statistics
EDP designation: WINB3M11
Lecturer: Prof. Dr Susanne Kruse, Prof. Dr Reinhard Bauer
Hours per week (SWS): 4 SWS + 2 SWS voluntary exercises
Availability: every semester
Type and mode: Lecture and exercises / compulsory subject
Teaching language: German
Contents: • Descriptive statistics (preparation and summarisation of data, determination of meaningful statistical key figures, histograms, box plots, empirical distribution function, correlation and linear regression), • Probability theory (combinatorics, random processes and their formal description, random variables and their distributions, determination of probability distributions, special discrete and continuous distributions and their key figures, limit theorems) • Inductive statistics (inference from the sample to the population, estimated values, confidence intervals and hypothesis tests)
Recommended literature (in the current edition): Bamberg, G.; Bauer, F.; Krapp, M.: Statistik-Arbeitsbuch: Übungsaufgaben - Fallstudien - Lösungen, Oldenbourg. Henze, N.: Stochastik für Einsteiger, Springer. Puhani, J.: Statistik – Einführung mit praktischen Beispielen, Springer. Wewel, M.: Statistik im Bachelor-Studium der BWL und VWL, Oldenbourg.
Notes:

WINB3M20 Operations Research (STEM Applications II)

Module name: *STEM Application I/II - Operations Research*

Module overview
EDP designation: WINB3M20
Module coordinator(s): Prof. Dr Susanne Kruse
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Placement (semester): 3rd/6th curriculum semester
Content requirements: Basic knowledge of mathematics, analogous to the modules Mathematics for Engineers I and Mathematics for Engineers II
Prerequisites according to SPO: None
Competences: Students can determine solutions for the optimisation classes linear optimisation, transport problems, integer and combinatorial optimisation and non-linear optimisation and interpret the results by: d) classifying practically relevant optimisation problems and transfering them into mathematical models, e) identifying suitable solution methods and algorithms and f) applying these independently to low-dimensional optimisation problems, in order to be able to evaluate the possible applications of mathematical optimisation methods in a practical context and assess the associated opportunities, risks and limitations.
Examination: Written exam (90 minutes)
Usability: The module serves to train basic skills in the field of mathematical optimisation in engineering and economics degree programmes. It establishes links to the application of mathematical optimisation methods in engineering and business administration as well as in professional practice. The knowledge acquired in this module is used in all areas of study and professional practice where situations are analysed, modelled and optimised in order to serve as a basis for decision-making.

Course: Operations Research
EDP designation: WINB3M21
Lecturer: Prof. Dr Susanne Kruse
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture incl. exercise / compulsory subject as part of STEM Application I and II
Teaching language: German
Contents:

- Linear optimisation: simplex algorithm, duality
- Transport problems: basic model, optimality test, stepping stone method, extensions of the basic model, reloading problem, assignment problem
- Integer optimisation: Gomory's cutting plane method
- Combinatorial optimisation: travelling salesman problems, heuristic opening methods, branch-and-bound methods
- Non-linear optimisation: without constraints (gradient method, Newton method), with constraints (SQP method)

Recommended literature (in the current edition):
Domschke, W.; Drexl, A.: Einführung in Operations Research, Springer.
Domschke, W.; Drexl, A.; Klein, R.; Scholl, A.; Voß, S.: Übungen und Fallbeispiele zum Operations Research, Springer.

Notes:
As part of the STEM Application I/II modules (WINB621), two of the following three courses must be completed: Statistics, Operations Research (OR) or Enterprise Research Planning (ERP)

WINB3M30 Enterprise Resource Planning (STEM Applications II)

Module name: *STEM Application I/II - Enterprise Resource Planning*

Module overview
EDP designation: WINB3M30
Module leader(s): Prof. Dr Bernd Scheuermann (Deputy: Prof. Dr Carsten Hahn)
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Placement (semester): 3rd/6th curriculum semester
Content requirements: Successful participation in the previous courses "General Business Administration", "External Accounting", "Computer Science I and II" or courses with comparable content.
Prerequisites according to SPO: None
Competences: Students will be able to use enterprise resource planning systems (ERP systems) for the (partially) automated execution of cross-departmental business processes by examining the architectures and functionalities of ERP systems, calculating with their methods of quantity-oriented planning and value-oriented posting, implementing application scenarios in a graphical process notation and independently executing integrated business processes on an introduced ERP system in order to later evaluate the technical and economic potential of ERP systems, automate business processes of companies through information technology integration in a meaningful way and thus improve the achievement of corporate goals.
Examination: Written exam (90 minutes)
Usability: The contents of this module can also be used in the modules "Economic Aspects of Digitalization", "Business Intelligence" and "Technical Systems, Components and Processes".

Course: Enterprise Resource Planning
EDP designation: WINB3M31
Dozent/in: Prof. Dr. Bernd Scheuermann (Deputy: Prof. Dr. Carsten Hahn)
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Lecture with exercise / compulsory subject
Teaching language: German or English
Contents: Fundamentals of business information systems. Introduction to Enterprise Resource Planning (ERP). Architecture of ERP systems. ERP implementation and customising. SAP: company and products. Introduction to a fictitious model company. Navigation in the ERP software (e.g.

SAP S/4HANA). Mapping organisational structures and business processes in ERP. Management of operational data in ERP systems and basics of enterprise application development. Case studies/exercises: Planning and control of operational processes from a selection of different business application areas supported by ERP, such as: Accounting, logistics or human resources.
Recommended literature: Literature will be announced at the beginning of the lecture
Notes:

WINB620 Computer Applications in Development and Production

Module name: *Computer Applications in Development and Production*
Module overview
EDP designation: WINB620
Module coordinator(s): Prof. Dr Florian Finsterwalder (Prof. Dr Hendrik Rust, Prof. Dr Christoph Roser)
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 6th curriculum semester
Content requirements: Knowledge and competences comparable to the modules Mathematics for Engineers I and II, Computer Science, Materials, Production Engineering, Electrical Engineering, Technical Mechanics
Prerequisites according to SPO: None
Competences: Using practical teaching and learning examples, students master the most important symbols used in technical drawings, such as tolerances. They will be able to recognise, assign and explain surface qualities as a prerequisite for the unambiguous interpretation of technical drawings with regard to function and production. Based on sketches, students are able to efficiently create technical drawings of given objects in accordance with standards. Through exercises on the computer, students master the computer-aided creation and processing of 3D objects and are able to design and construct simple assemblies following the requirements.. Students can use different approaches to 2D and 3D modelling and explain mathematical principles and data structures in this context. They can consciously select the most suitable modelling approaches depending on the application. Students are able to use 3D digitalization systems to create computer-aided 3D models of real bodies and can explain the underlying algorithms. Students are able to process and evaluate designs using digital tools and create complex constructions. Students will be able to transfer these designs along the digital process chain into production and select - and programme if applicable - the appropriate production equipment. Students will be able to evaluate computer-aided manufacturing processes and machining strategies from various optimisation aspects (e.g. surface quality, cycle time, costs) by means of specific case studies. Furthermore, students can apply, evaluate and critically analyse computer-aided methods along the value chain both horizontally (e.g. development, planning, service) and vertically (e.g. from component manufacturing simulation to plant simulation) in order to minimise overall costs, for example.

Students will be able to outline and explain common types of industrial robots in order to select specific robots or manipulators depending on the application, e.g. in terms of speed and costs, or to adapt them to the specific task. Students are aware of the importance of digital transformation in industry and society and are able to reflect on the associated ethical issues, e.g. in order to identify optimisation potential and new business areas (such as individualization) hereby taking into account ethical aspects, and subsequently develop them further.
Examination: Written exam (90 minutes) and practical work (CAD design, duration 4 weeks). The specific form of the examination will be announced at the beginning of the course.
Usability:

Course: CAD, CAM, CAE, CAX
EDP designation: WINB621
Lecturer: Prof. Dr Florian Finsterwalder
Hours per week (SWS): 3 SWS
Availability: every semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: • CAD basics and functionality • 3D modelling • Data formats • Digitalization systems: Tactile and optical measuring systems, 3D scanning process • Machine tools: basics, design, drives and components • CNC technology: control, sensors and regulation • Programming of CNC machines • Processing strategies • CAD/CAM process chain • CAD/CAM system and simulation • Application of CAE using examples (practical exercises) • Topology optimisation • Additive manufacturing technologies and applications • Additive process chain • Business models and industrial implementation • Applications of robots in industrial production • Types of robots and robot kinematics • Industry 4.x: History, building blocks of the digital transformation • Approaches to modelling and simulating factories • Digital twin • Social and ethical issues
Recommended literature (in the current editions): Sandor Vajna, Christian Weber, Helmut Bley, Klaus Zeman, CAx für Ingenieure, Springer Viehweg, ISBN 978-3-540-36038-4.

Peter Hehenberger, Computerunterstützte Produktion, Springer Viehweg, ISBN 978-3-662-60875-3.
Notes:

Course: Technical Drawing
EDP designation: WINB622
Lecturer: N.N.
Hours per week (SWS): 1 SWS
Availability: every semester
Type and mode: Lecture with exercises / compulsory subject
Teaching language: German
Contents: • Basics of technical drawing • Visualisation of workpieces, dimensioning, views, sections, tolerances and fits • Parts list structure and content • Machine elements and standard part designations • Construction technology
Recommended literature: • Labisch, S. u. Weber, C. (2017). Technisches Zeichnen - Selbstständig lernen und effektiv üben. Berlin: Springer
Notes:

WINB630 Scientific Seminar

Module name: *Scientific Seminar*
EDP designation: WINB630
Module leader(s): Prof. Dr Hagen Krämer
Module scope (ECTS): 5 CP (22.5 hours of attendance and 127.5 hours of self-study including preparation of the term paper)
Classification (semester): 6th curriculum semester
Content requirements: Completed basic studies WINB
Prerequisites according to SPO: None
Competences: Students will be able to categorise scientific work in the context of scientific theory and adequately assess and apply common methods of empirical research. They will have mastered the basic techniques of scientific work to such an extent that they will be able to produce their first scientific papers in accordance with current scientific standards.
Examination: Student research project (in the form of a term paper, duration 6 weeks) with presentation (15 minutes). The module is passed if the course Scientific Work with the corresponding coursework has been successfully completed and the scientific term paper has been passed. The specific form of the coursework will be announced at the beginning of the course.
Usability: The module imparts the methodological knowledge for the preparation of academic papers, such as term papers and theses.

Course: Scientific Work
EDP designation: WINB631
Lecturer: Prof. Dr Hagen Krämer
Hours per week (SWS): 2 SWS
Availability: every semester
Type and mode: Lecture and seminar / compulsory subject
Teaching language: German
Contents: From the question to the problem and research design; literature review (systematic and unsystematic literature research; databases and bibliographies); basics of scientific theory; empiricism: methods of empirical research, techniques of scientific work (organising and structuring; presenting; citing, paraphrasing, referencing; avoiding plagiarism; convincing with graphics; bibliography; scientific writing incl. final editing.

Recommended literature: Albers, Sönke; Klapper, Daniel; Konradt, Udo; Walter, Achim und Wolf, Joachim (Hrsg.): Methodik der empirischen Forschung, 2. Auflage, Wiesbaden, 2007. Disterer, Georg: Studienarbeiten schreiben: Seminar-, Bachelor-, Master- und Diplomarbeiten in den Wirtschaftswissenschaften. Berlin, Heidelberg: Springer Gabler,(in the current edition). Döring, Nicola und Bortz, Jürgen, Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften, Berlin Heidelberg, (in the current edition). Kornmeier, M.: Wissenschaftliches Schreiben leicht gemacht, 8. Auflage, Stuttgart 2018. Richtlinien und Hinweise zur Anfertigung wissenschaftlicher Arbeiten an der Fakultät für Wirtschaftswissenschaften (in the current edition). Schlicht, Laurens: Wie geht Wissenschaft? Eine schnelle Einführung in das wissenschaftliche Arbeiten, Verlag Ferdinand Schöningh, Paderborn 2022. Theisen, Manuel: Wissenschaftliches Arbeiten, 17. Auflage, München 2017. Wördenweber, M.: Leitfaden für wissenschaftliche Arbeiten, 2. Auflage, Berlin 2019. Wöhe, Günter: Methodologische Grundprobleme der Betriebswirtschaftslehre, Meisenheim, 1959.
Notes:

Course: Term Paper
EDP designation: WINB632
Lecturer: Professors of the Faculty W
Hours per week (SWS):
Availability: every semester
Type and mode: Seminar / compulsory subject
Teaching language: German
Contents: The topic of the term paper is determined in consultation with the supervising professor.
Recommended literature: see above Course Scientific Work
Notes:

WINB640 Project Seminar

Module name: *Project Seminar*

Module overview
EDP designation: WINB640
Module coordinator(s): Prof. Dr Hendrik Rust, Prof. Dr Reinhard Bauer, Prof. Dr Florian Finsterwalder, Prof. Dr Claas-Christian Wuttke
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study)
Classification (semester): 6th curriculum semester
Content requirements: Expertise from semesters 1-6
Prerequisites according to SPO: None
Competences: Students are able to plan, structure and manage a project from start to finish based on a specific practical task. Students can lead and coordinate a project team, manage risks and solve problems and conflicts within the team. They are also able to create documentation for complex projects and present and defend the project to a wide range of stakeholders. Students have an insight into typical challenges and suitable solutions in professional practice, such as changing and contradictory requirements, conflicting objectives, time and budget constraints, etc.
Examination: Student research project (in the form of a project paper, duration 4 weeks) with presentation (15 minutes).
Usability:

Course: Project Seminar
EDP designation: WINB641
Lecturer: Prof. Dr Hendrik Rust, Prof. Dr Reinhard Bauer, Prof. Dr Florian Finsterwalder, Prof. Dr Claas-Christian Wuttke
Hours per week (SWS): 4 SWS
Availability: Every semester / compulsory subject
Type and mode: Lecture and project work
Teaching language: German or English
Contents: Theory • Basics • Best Practices • Risk management • Stakeholder management • Conflict resolution • Teamwork and communication Project work

- Project briefing
- Project planning
- Project processing
- Regular interim presentations
- Final presentation

Recommended literature:
Timminger, Holger: Modernes Projektmanagement – Mit traditionellem, agilen und hybridem Vorgehen zum Erfolg. Whiley-VCH, 2017.
Andler, Nicolai: Tools für Projektmanagement, Workshops und Consulting – Kompendium der wichtigsten Techniken und Methoden. Publics Publishing 2015.
Further literature will be announced in the lecture.

Notes:

WINB650 Elective Subject I

Module name: *Elective Subject I*

Module overview
EDP designation: WINB650
Module coordinator(s): Prof. Dr Florian Finsterwalder
Module scope (ECTS): 5 CP
Classification (semester): 6th curriculum semester
Content requirements: Completed basic studies
Prerequisites according to SPO: None
Competences: Students are able to develop their social, ethical, cognitive and/or communicative competences beyond those learnt in the regular curriculum. The competences addressed in each case are based on the elective courses offered.
Examination: Written exam (90 minutes) or presentation (duration 15 minutes) or term paper (duration 4 weeks)
Usability:

Course: Elective subject I
EDP designation: WINB651
Lecturer: various lecturers - depending on the current range of subjects range of subjects
Hours per week (SWS):
Rotation: every semester with changing offer
Type and mode: Lecture / compulsory elective course
Teaching language: German or English
Contents: The contents are listed in the module descriptions of the modules offered as elective subjects.
Recommended literature:
Notes:

WINB660 Elective Subject II

Module name: *Elective Subject II*

Module overview
EDP designation: WINB660
Module coordinator(s): Prof. Dr Florian Finsterwalder
Module scope (ECTS): 5 CP
Classification (semester): 6th curriculum semester
Content requirements: Completed basic studies
Prerequisites according to SPO: None
Competences: Students are able to develop their social, ethical, cognitive and/or communicative competences beyond those learnt in the regular curriculum. The competences addressed in each case are based on the elective courses offered.
Examination: Written exam (90 minutes) or presentation (duration 15 minutes) or term paper (duration 4 weeks).
Usability:

Course: Elective subject I
EDP designation: WINB661
Lecturer: various lecturers - depending on the current range of subjects range of subjects
Hours per week (SWS):
Rotation: every semester with changing offer
Type and mode: Lecture / compulsory elective course
Teaching language: German or English
Contents: The contents are listed in the module descriptions of the modules offered as elective subjects.
Recommended literature:
Notes:

Hochschule Karlsruhe
University of
Applied Sciences

Fakultät für
Wirtschafts-
wissenschaften

7. Semester

WINB710 Business Simulation

WINB720 English Language

WINB730 Bachelor's Thesis Colloquium

WINB740 Bachelor's Thesis

WINB710 Business Simulation

Module name: *Business Simulation*

Module overview
EDP designation: WINB710
Module coordinator(s): Prof. Dr Stefan Bleiweis, Prof. Dr Christian Braun, Prof. Dr Benjamin Kern
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study)
Classification (semester): 7th curriculum semester
Content requirements: Knowledge of business administration, bookkeeping and accounting, financing and investment, cost accounting, marketing, logistics and SCM
Requirements according to SPO: None
Competences: On completion of the course, students will have developed a basic understanding of how a company is managed holistically in a global and highly competitive business environment. They are able to carry out business analyses using business management theories and to plan and then implement entrepreneurial decisions. In doing so, they develop the ability to use a wide range of information and highly complex interrelationships within a company to make entrepreneurial decisions. Students are able to develop a corporate strategy and derive specific measures from it and participate in the implementation of a corporate strategy. They can organise group dynamic processes under time pressure and bring about decisions on problems in a team.
Examination: Written examination (90 minutes) or coursework (in the form of a project, duration 10 weeks, includes 2 presentations, project report and diary. The coursework in this form is completed as group work and oral examination (20 minutes) or coursework (duration 6 weeks). The specific form of examination and further details will be announced at the beginning of the course.
Usability: In the module, the knowledge and skills acquired in the degree programme in the field of business administration are linked through practical application in the business simulation.

Course: Business Simulation
EDP designation: WINB711
Lecturer: Prof. Dr Stefan Bleiweis, Prof. Dr Christian Braun, Prof. Dr Benjamin Kern
Hours per week (SWS): 4 SWS
Availability: every semester
Type and mode: Laboratory, simulation / compulsory subject
Teaching language: English or German
Contents:

In small groups, students manage companies in a simulated market and make a series of strategic and operational decisions. This is based on detailed reports with data on the managed company and the market as well as an outlook for the next business period.

Based on a self-developed corporate strategy, the individual groups define specific measures and make decisions in the teams. This involves analysing the market and company conditions and deriving a wide range of business decisions in a structured manner. After each period, the groups gain insights into the consequences of their business activities in order to further develop business processes and decision-making behaviour.
The students are supported by a professor and a laboratory assistant.

Recommended literature:

Bieg, H., Kußmaul, H., Waschbusch, G.: Finanzierung, 4. Auflage, München, 2023.
Bieg, H., Kußmaul, H., Waschbusch, G.: Investition, 3. Auflage, München, 2016.
Coenenberg, A., Fischer, T., Günther, T.: Kostenrechnung und Kostenanalyse, 9. Auflage, Stuttgart, 2016.
Friedl, G., Hofmann, C., Pedell, B.: Kostenrechnung, 4. Auflage, München, 2022.
Hölscher, R., Helms, N.: Investition und Finanzierung, 2. Auflage, Berlin, 2018.
Kotler, P., Armstrong, G., Harris, L. C., Piercy, N.: Grundlagen des Marketing, 7. Auflage, Hallbergmoos, 2019.
Meffert, H., Burmann, C., Kirchgeorg, M., Eisenbeiß, M.: Marketing, 13. Auflage, Wiesbaden, 2019.
Tuckmann, B., Jensen M. 1977: Stages of small group development revisited. In: Group and Organization Studies, 2. 419-427.
Wöltje, J.: Investition und Finanzierung, 3. Auflage, Freiburg, 2022.
Wöltje, J.: Kosten- und Leistungsrechnung, 3. Auflage, Freiburg, 2022.

Notes:
Different simulation games, some with access restrictions, can be offered in parallel.

WINB720 English Language

Module name: *English Language*

Module overview
EDP designation: WINB720
Module coordinator(s): Prof. Dr Andrea Cnyrim
Module scope (ECTS): 10 CP (90 hours attendance, 210 hours self-study)
Placement (semester): 7th curriculum semester; recommended in semesters 1 + 2
Content requirements: Placement test or successful completion of the IFS-B2 course
Prerequisites according to SPO: None
Competences: Students can confidently manage the communicative aspects of their business-related and engineering-related professional activities in the target language English and express themselves effectively both orally and in writing by preparing presentations on business and technical topics, conducting scientific discussions, giving lectures, analysing and evaluating economic and technical issues, so that they can later move effortlessly in the context of international university and business culture and also deal confidently with culture-specific communicative conventions and language registers (e.g. in correspondence or specialist lectures).
Examination: The modalities of the foreign language coursework and examinations are determined by the organising Institute of Foreign Languages. The module consists of two courses, see the descriptions of the examinations at the Institute of Foreign Languages As a rule, each course is completed with a written examination (120 minutes) and an oral examination or other forms of examination.
Usability:

Course: English
EDP designation: WINB 721
Lecturer: Lecturers and lecturers of the IFS
Hours per week (SWS): 8 SWS
Availability: every semester
Type and mode: Exercise and seminar with laboratory character/compulsory subject
Teaching language: English
Contents: Business English and Technical English according to the CEFR at level C1. Development of listening, reading, speaking and writing skills for professional situations at C1 CEFR level using suitable interactive, communicative teaching formats with reference to the professional target situations in the desired business management or engineering positions. In Technical English, the main focus is on the acquisition and application of linguistic strategies and structures as well as technical terms in technical English. This is used, for example, to describe

production processes or to present technical issues. In Business English, the focus is on the acquisition and application of linguistic strategies and structures as well as technical terms in business English. As a rule, a company simulation is carried out in this course. Common target situations are, for example, business negotiations, writing business correspondence and creating or explaining product and company presentations.
Recommended literature: Textbook or script as recommended by the lecturer.
Notes: After successfully completing the courses and obtaining the IFS certificate, students have reached level C1. Job-oriented interactive communicative competence in the target language English in the specialist areas of Business English and Technical English. Orientation towards the Common European Framework of Reference for Languages (CEFR) (C1).

WINB730 Bachelor's Thesis Colloquium

Module name: *Bachelor's Thesis Colloquium*

Module overview
EDP designation: WINB 730
Module coordinator(s): Prof. Dr Florian Finsterwalder
Module scope (ECTS): 3 CP (90 hours of self-study for the preparation of the presentation)
Classification (semester): 7th curriculum semester
Content requirements: Completed basic studies, most of the examinations of the main study programme completed.
Prerequisites according to SPO: The module Scientific Seminar must be completed and a maximum of 10 CP may be missing from the main study programme.
Competences: Students can work on a defined scientific topic independently, results-orientated and appropriately according to scientific criteria and present and discuss the results to date. They can research, analyse, abstract and structure information and specialist literature, independently acquire the relevant specialist and methodological knowledge, select suitable scientific methods and procedures and use them to solve the task of the Bachelor's thesis, interpret, evaluate and critically reflect on the knowledge gained.
Examination: As part of the colloquium, a presentation (duration 15 minutes) must be given.
Usability:

Course: Colloquium
EDP designation: WINB 731
Lecturer: Professors at Karlsruhe University of Applied Sciences
Hours per week (SWS): -
Cycle: permanent
Type and mode: Presentation / compulsory course as part of the preparation of the Bachelor's thesis
Teaching language: German or English
Contents: The colloquium includes a presentation of the results of the Bachelor's thesis to date before finalisation in order to provide students with feedback and further professional impetus for the further development of the thesis.
Recommended literature:
Notes:

WINB740 Bachelor‘s Thesis

Module name: Bachelor‘s Thesis

Module overview
EDP designation: WINB 740
Module coordinator(s): Prof. Dr Florian Finsterwalder
Module scope (ECTS): 12 CP (360 hours of self-study for the preparation of the thesis))
Classification (semester): 7th curriculum semester
Content requirements: Completed basic studies, most of the examinations of the main study programme completed.
Prerequisites according to SPO: The module Scientific Seminar must be completed and a maximum of 10 CP may be missing from the main study programme.
Competences: Students are able to work on a defined economic and/or engineering issue within the specified time frame in an independent, results-oriented and appropriate manner according to scientific criteria by researching, analysing, abstracting and structuring information and specialist literature and independently acquiring the relevant specialist and methodological knowledge. They can select suitable scientific methods and procedures and use them to solve the questions posed in the Bachelor's thesis as well as interpret, evaluate and critically reflect on the results obtained - also with regard to the consequences for society, ecology and sustainability. Students can document the investigations in a suitable form and formulate the results of the Bachelor's thesis in writing in a clearly structured manner in accordance with scientific standards using appropriate specialist terminology.
Examination: Bachelor’s thesis (processing time 4 months)
Usability:

Course: Bachelor’s Thesis
EDP designation: WINB 741
Lecturer: Professors at Karlsruhe University of Applied Sciences
Hours per week (SWS):
Cycle: permanent
Type and mode: Self-study elaboration of Bachelor's thesis / compulsory module
Teaching language: German or English
Contents: The topic of the bachelor's thesis is assigned by the examination board. Students may propose a topic. The topic must be relevant to the subject and deal with subject-specific or interdisciplinary issues. Topics can be worked on in co-operation with companies.
Recommended literature: Kornmeier, M.: Wissenschaftliches Schreiben leicht gemacht, 9. Auflage, Stuttgart 2021. Schwaiger, M.; Meyer, A.: Theorien und Methoden der Betriebswirtschaft, München 2009.

Theisen, M.: Wissenschaftliches Arbeiten, 17. Auflage, München 2017. Wördenweber, M.: Leitfaden für wissenschaftliche Arbeiten, 2. Auflage, Berlin 2019.
Notes:

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Specialization

Digitalization

WINB350T Digitalization Technologies

Module name: *Digitalization Technologies*

Module overview
EDP designation: WINB350T
Module coordinator(s): Prof. Dr Bernd Scheuermann (Deputy: Prof. Dr Jens Nimis)
Module scope (ECTS): 5 CP (45 hours attendance time and 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Successful participation in the previous courses General Business Administration, Computer Science I and Computer Science II or courses with comparable content.
Prerequisites according to SPO: None
Competences: Students can develop digital services by examining the architectures, functionalities and properties of digitization technologies, by implementing and analysing digital front and back-end services using development and analysis tools, by combining hardware and software technologies in order to later evaluate the technical and economic potential of digitization technologies, implement innovative business models around digital services and thus improve the achievement of corporate goals and achieve added value for customers through digital services.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: The module lays the foundations for the following courses: "Data-Driven Technologies" (data acquisition via front-end devices and services, use of data as a key resource of a company), "Development of Digital Products and Services" (technological foundations and tools for the design of digital products and services).

Course: Digitalization Technologies
EDP designation: WINB351T
Lecturer: Prof. Dr Bernd Scheuermann (Deputy: Prof. Dr.-Ing. Jens Nimis)
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture, exercise / compulsory subject in the specialization in digitalization
Teaching language: German or English
Contents: Lecture: Fundamentals and fields of application of digitalization. Introduction to services and servitization. Market overview of digitalization products. Digitalization history and trends. Differentiation between front-end and back-end services. Overview of digitalization technologies. Selected digitalization technologies. These include, for example, identification technologies (e.g. RFID, QR, biometrics), localization technologies (e.g. GPS, Galileo), user

interaction technologies (e.g. touch, gesture or voice control), display technologies (e.g. augmented reality, virtual reality), mobile devices (e.g. mobile phones, tablets, smartphones). augmented reality, virtual reality), mobile communication technologies (e.g. mobile phone networks, Wifi, Bluetooth, NFC), infrastructure technologies (e.g. cloud computing or fog computing) or the Internet of Things (e.g. actuator and sensor technologies) Exercises: Utilization and combination of selected hardware and software technologies for the development and evaluation of prototypes of digital services with the associated back-end and front-end services.
Recommended literature: Will be announced in the lecture
Notes:

WINB360T Development of Digital Products and Services

Module name: *Development of Digital Products and Services*

Module overview
EDP designation: WINB360T
Module coordinator(s): Prof. Dr Claas Christian Wuttke
Module scope (ECTS): 5 CP (45 h classroom teaching and 105 h self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of operational and technical contexts and processes comparable to the course ABWL and the module Production and Quality
Prerequisites according to SPO: None
Competences: Students can select suitable methods and processes for determining market requirements (customer integration) as well as the technological framework conditions (technology management) according to the situation (e.g. project type and scope, data availability, employee qualifications) and apply them professionally in order to systematically develop new data-based products and services and implement them in a marketable manner. Students are able to plan and manage the development of digital products and services in an interdisciplinary manner by applying the concepts and methods of integrated and model-based product development in order to develop holistic business models that ensure the long-term success of the company.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: The module is also offered with the same content in the Bachelor's degree programme in Business Management in the specialization "Digital Business Management".

Course: Development of Digital Products and Services
EDP designation: WINB361T
Lecturer: Prof. Dr Claas Christian Wuttke, Deputy: Prof. Dr Christian Braun
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture - flipped classroom / compulsory subject in the specialization in digitalization
Teaching language: German or English
Contents: • Product definition, product life cycle, product and portfolio management. • Methods, processes and organisation of product development

- Integrated product development and customer involvement
- Innovation and technology management
- Business models for smart products and smart services

Recommended literature: e.g.

Aumayr, K. J. (2019): Erfolgreiches Produktmanagement – Toolbox für das professionelle Produktmanagement und Produktmarketing. 5. Auflage. Gabler.
Ehrenspiel, K.; Meerkamm, H. (2017): Integrierte Produktentwicklung: Denkabläufe, Methodeneinsatz, Zusammenarbeit. Hanser.
Gassmann, O., Frankenberger, K., Csik, M. (2017): Geschäftsmodelle entwickeln. 55 innovative Konzepte mit dem St. Galler Business Model Navigator. Hanser.
Gochermann, J. (2020): Technologiemanagement. Technologien erkennen, bewerten und erfolgreich einsetzen. Springer.
Graner, Marc (2015): Methodeneinsatz in der Produktentwicklung. Bessere Produkte, schnellere Entwicklung, höhere Gewinnmargen. Springer Gabler.
Lewrick, M.; Link, P.; Liefer, L. (2017): Das Design Thinking Playbook. Mit traditionellen, aktuellen und zukünftigen Erfolgsfaktoren. Vahlen.
Osterwalder, A.; Pigneur, Y. (2011): Business Model Generation. Campus.
Osterwalder, A.; Pigneur, Y.; Bernarda, G.; Smith, A. (2015): Value Proposition Design. Campus.
Preußig, J. (2015): Agiles Projektmanagement. Scum, Use Cases, Task Boards & Co. Haufe.
Schlattmann, J.; Seibel A. (2017): Aufbau und Organisation von Entwicklungsprojekten. Springer.
Wuttke, C.C. et al. (2016): Adaptable and Customizable Development Process for Product-Service-Systems. Procedia CIRP No. 47, 317 – 322.
Wuttke, C.C. et al. (2018): Systematic Prototyping of Product-Service Systems. Procedia CIRP No. 73, 50 – 55.
Wuttke, C.C. et al. (2019): Individualized Customer Integration Process for the Design of Industrial Product-Service Systems. Procedia CIRP 63, p. 83–88.
Wuttke, C.C. et al. (2020): Strategic planning of continuous stakeholder involvement in the design of industrial product-service systems. IET Collaborative Intelligent Manufacturing 2 (3), p. 123-131.

Notes:

WINB450T Introduction to Artificial Intelligence

Module name: *Introduction to Artificial Intelligence*

Module overview
EDP designation: WINB450T
Module coordinator(s): Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Mathematical and computer science knowledge comparable to the modules Computer Science I, Computer Science II, Mathematics for Engineers I, Mathematics for Engineers II
Prerequisites according to SPO: None
Competences: Students have an overview of methods of model-based and data-based artificial intelligence. Students have a deeper insight into some exemplary methods of artificial intelligence by implementing them themselves in a suitable high-level programming language in order to supplement their theoretical knowledge with practical experience. Students are able to analyse real-world applications with regard to artificial intelligence methods by abstracting tasks, formulating requirements and identifying suitable AI methods in order to assess potential in the operational environment and initiate, accompany, control or monitor implementation projects.
Examination: Written exam (90 minutes) or oral exam (30 minutes) or practical work (duration 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Introduction to Artificial Intelligence
EDP designation: WINB450T
Lecturer: Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Hours per week (SWS): 4 SWS
Availability: annually in the winter semester
Type and mode: Lecture with integrated exercise / compulsory subject in the specialization in digitalization
Teaching language: German or English
Contents: • Basic artificial intelligence techniques (e.g. searching, dynamic programming and decision trees) • Classic planning and problem solving • Logic, knowledge systems and inference • Machine learning (e.g. supervised learning, unsupervised learning, reinforcement learning)

• Optimisation (e.g. mathematical optimisation, constraint programming, metaheuristics)
Recommended literature: Stuart, Norvig: Artificial Intelligence - A Modern Approach, 3.Auflage , 2016, Pearson.
Notes:

WINB460T Economic Aspects of Digitalization

Module name: *Economic Aspects of Digitalization*
Module overview
EDP designation: WINB460T
Module coordinator(s): Prof. Dr Hagen Krämer (Deputy: Prof. Dr Anna Heszler)
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of business administration, economics, marketing
Prerequisites according to SPO: None
Competences: Students can analyse the influences of digitalization and the Internet on companies, consumers, markets and business models by comparing market models of the digital economy and the special characteristics of digital goods and information goods with the market models and characteristics of tangible goods, so that they can draw conclusions for corporate pricing and product strategies, estimate the effects of digitalization on growth, employment and overall economic productivity development and assess the quantitative and qualitative effects on the labour market, consumers and society. Students are also able to describe business models based on key dimensions, analyse and compare different business models and derive and explain innovative approaches for their further development. By analysing and discussing different real digital business models, they have a basic understanding of the potential that digital technologies have for generating value and which specific value creation dimensions can be considered for creating customer value in order to analyse business models in their professional activities and develop ideas for new digital business models or value potentials within existing business activities.
Examination: Written examination (90 minutes) or written examination (45 minutes) + term paper (in the form of a portfolio, 10 weeks) or written examination (45 minutes) + term paper (duration 6 weeks) or two term papers (duration 6 weeks each). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Digital Markets and Goods
EDP designation: WINB461T
Lecturer: Prof. Dr Hagen Krämer (Deputy: Prof. Dr Johannes Schmidt)
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject in the specialization in digitalization

Teaching language: German or English
Contents: Fundamentals of the digital economy, basic innovations, disruption and creative destruction, innovations, productivity growth and digital transformation, information economy, production, distribution and consumption on digital markets, networks and network goods, intermediaries and market models in the real and digital world, virtual money (private cryptocurrencies and digital central bank money), effects of digitalization on the economy and society.
Recommended literature: Brynjolfsson, E., McAfee, A.: The Second Machine Age, Cambridge 2014. Clement, R., Schreiber, D., Bossauer, P., Pakusch, Chr.: Internet-Ökonomie. Grundlagen und Fallbeispiele der vernetzten Wirtschaft, Berlin Heidelberg (jeweils in der aktuellen Auflage). Krämer, H.: Digitalisierung, Monopolbildung und wirtschaftliche Ungleichheit, in: Wirtschaftsdienst, 99. Jg., H. 1/2019, S. 47-52. Krämer, H.: Technische Revolution oder säkulare Stagnation? Historische, technologische und strukturelle Dimensionen des Produktivitätsparadoxons, in: SPW 2/2018, S. 16-20. Petersen, T.: Diginomics verstehen. Ökonomie im Licht der Digitalisierung, Stuttgart 2020. Roth, St., Corsten, H. (Hrsg.) Handbuch Digitalisierung, Verlag Franz Vahlen, München 2022. Schapiro, C., Farrell, J.: The Economics of Information Technology, Cambridge 2004.
Notes:

Course: Business Models in the Digital World
EDP designation: WINB462T
Lecturer: Prof. Dr Anna Heszler (Deputy: Prof. Dr Christian Braun)
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type and mode: Seminar / compulsory subject in the specialization in digitalization
Teaching language: German or English
Contents: • Introduction to the digital transformation • Fundamentals of digital business models • Customer centricity as the basis for successful business models • Generating value by utilising digital potential • Evolution of market and competitive structures and value creation philosophies • Starting points for digital transformation
Recommended literature: Annarelli, A., Battistella, C., und Nonino, F. The Road to Servitization: How Product Service Systems Can Disrupt Companies' Business Models, Cham 2019. Christensen, Clayton C.: The Innovator´s Dilemma: When New Technologies Cause Great Firms to Fail, Boston 2016. Gassmann, O, Frankenberger, C., Choudury, M.: Business Model Navigator: The Strategies Behind the Most Successful Companies, 2. Auflage, Harlow 2020.

Osterwalder A, Pigneur Y: Business Model Generation - A Handbook for Visionaries, Game Changers, and Challengers, Frankfurt, New York 2011. Osterwalder, A., Pigneur, Y., Bernarda, G., Smith, A.: Value Proposition Design - How to Create Products and Services Customers Want, Hoboken 2014. Tzuo, T., Weisert, G., Subscribed - Why the Subscription Model Will Be Your Company's Future-and What to Do About It, Milton Keynes 2018.
Notes:

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Specialization

Intelligent Production Systems

WINB350R Digital Manufacturing and Numerical Calculation

Module name: *Digital Manufacturing and Numerical Calculation*
Module overview
EDP designation: WINB350R
Module coordinator(s): Prof. Dr Florian Finsterwalder (Prof. Dr Griesbaum)
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of mathematics and technical mechanics, comparable to the modules Mathematics for Engineers I and II, Technical Mechanics
Prerequisites according to SPO: None
Competences: Using a classification scheme, students will be able to name the most important processes and technologies of digital, in particular additive manufacturing, as a prerequisite for a targeted selection of processes. They will also be able to explain the materials used. Furthermore, students will be able to use practical exercises and experiments to master the use of common 3D printers and use them to independently produce components. When designing and constructing their own components or assemblies, students apply the methods they have learnt in product development and -design, and in this way become familiar with the process chain through to post-processing and critically examine it in order to be able to select and apply the optimum production technologies for selected problems. In some cases, students also examine new (manufacturing) technological approaches on the basis of current publications, for example to further improve quality or productivity and thus the cost situation of digital manufacturing, especially in comparison to traditional template-based processes. Students assess new business models that arise in the context of digital or additive manufacturing. Finally, students analyse trends based on current publications and develop new ideas for product development and engineering of the future, particularly with regard to the use of artificial intelligence. Students can numerically implement selected analytical calculation methods in engineering mechanics and visualise the results clearly. They can model and analyse elementary mechanical load cases using commercial FEM software and interpret the results. They can apply the method of topology optimisation to geometrically simple components and evaluate the resulting structures using the analytical methods of engineering mechanics. Students gain an insight into the field of numerical calculation, which is an established component in the development of sophisticated and highly resilient components, for example in mechanical and plant engineering. Calculation methods are increasingly being used in the development of additively manufactured components in order to optimally utilise the potential of additive manufacturing. The course prepares students to make

decisions in the context of additive manufacturing with accompanying computational analyses where necessary.
Examination: Written exam (90 minutes) or written exam (45 minutes) and coursework (completion of smaller tasks over the course of the semester). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Digital Manufacturing
EDP designation: WINB351R
Lecturer: Prof. Dr Florian Finsterwalder
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture with laboratory / compulsory subject in the specialization Intelligent Production Systems
Teaching language: German or English
Contents: • Introduction to additive manufacturing, classification and differentiation from conventional manufacturing technologies • Process overview • Materials and substances • Device design and components • Modelling • Production-oriented design and optimisation • Work on own problem (regarding process, product or application) using the methods learned, e.g. topology optimisation
Recommended literature: Andreas Gebhardt, Additive Fertigungsverfahren, Carl Hanser Verlag München, 2016. Ian Gibson, David Rosen, Brent Stucker, Mahyar Khorasani, Additive Manufacturing Technologies, Springer-Verlag, 2021.
Notes:

Course: Numerical Calculation
EDP designation: WINB352R
Lecturer: Prof. Dr Rainer Griesbaum
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture with exercise / compulsory subject in the specialization Intelligent Production Systems
Teaching language: German
Contents:

- Beam as finite element, trusses, calculation of beam forces and nodal displacements using the finite element method (FEM). Calculate and visualise stresses and deformations of the beam using FEM.
- Check production-oriented design for additive manufacturing with FEM, for example notch shape optimisation with tension triangles.
- Topology optimisation with MATLAB: a beam becomes a truss.
- Topology optimisation with Autodesk Fusion 360 and/or ANSYS Workbench: a practical example.

Recommended literature:

- Knothe, Klaus; Wessels, Heribert: Finite Elemente – Eine Einführung für Ingenieure. Berlin, Heidelberg: Springer-Verlag, 2017.
- Mattheck, Claus: Die Körpersprache der Bauteile – Enzyklopädie der Formfindung nach der Natur. Karlsruhe: Verlag KIT, 2017.
- Steinke, Peter: Finite-Elemente-Methode – Rechnergestützte Einführung. Berlin, Heidelberg: Springer-Verlag, 2015.

Notes:

WINB360R Automation

Module name: *Automation*

Module overview
EDP designation: WINB360 R
Module coordinator(s): Prof. Dr.-Ing. Christian Wurll, Prof. Dr.-Ing. Björn Hein
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of electrical engineering, semiconductor technology and technical mechanics
Prerequisites according to SPO: None
Competences: Participants will be able to design control systems for automation tasks by: a) understanding the modelling of technical processes, b) knowing the components and structures of automation, c) having a comprehensive overview of sensors and actuators, d) learning how to programme with IEC 61131-compatible controllers, for example, in order to be able to communicate competently and "on an equal footing" with engineers from other disciplines and make joint decisions later in their careers.
Examination: Written examination (90 minutes) or term paper (in the form of a project, duration 4 weeks) + oral examination (20 minutes) or oral examination (duration 45 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Automation
EDP designation: WINB351R
Lecturer: Prof. Dr.-Ing. Christian Wurll, Prof. Dr.-Ing. Björn Hein
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Intelligent Production Systems
Teaching language: German
Contents: The general structure of automation systems is considered and the sensors (measurement technology, signal processing, the most important analogue and digital sensors) and actuators (mechanical, pneumatic, electrical and mechatronic actuators) typically used there are discussed. The lecture concludes with an introduction to PLC programming and an insight into the use of robot systems in industrial applications.
Recommended literature (in the current edition): Comprehensive script,

Textbooks: Heinrich et. Al. "Grundlagen der Automatisierung“. Lauber, Göhner: "Prozessautomatisierung".
Notes: Beamer lecture, supplemented by notes for examples and exercises. An extensive collection of questions for self-checking concludes each chapter. Animations, numerous videos and illustrative samples are also available.

WINB450R AI/Machine Learning

Module name: AI / Machine Learning

Module overview
EDP designation: WINB450R
Module coordinator(s): Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Mathematical and computer science knowledge comparable to the modules Computer Science I, Computer Science II, Mathematics for Engineers I, Mathematics for Engineers II
Prerequisites according to SPO: None
Competences: Students have an overview of methods of model-based (e.g. classical planning) and data-based (e.g. decision trees) artificial intelligence. Students are able to use methods of artificial intelligence, machine learning and deep learning in robotics applications in order to understand the potential of AI and machine learning in robotics applications (e.g. production) and to implement simple applications themselves. This includes, for example, computer vision or path planning applications. Students have a deeper insight into some exemplary methods of artificial intelligence by implementing them themselves in a suitable higher programming language in order to supplement their theoretical knowledge with practical experience.
Examination: Written exam (90 minutes) or oral exam (30 minutes) or practical work (duration 4 weeks). The specific form of examination will be announced at the beginning of the course
Usability:

Course: Model-based AI
EDP designation: WINB451R
Lecturer: Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type and mode: Lecture with integrated exercise/compulsory subject in the specialization Intelligent Production Systems
Teaching language: German or English
Contents: • Basic techniques (e.g. searching, dynamic programming and decision trees) • Classic planning and problem solving • Optimisation (e.g. mathematical optimisation, constraint programming, metaheuristics) • Practical exercises on some of the topics mentioned above

Recommended literature: Stuart, Norvig: Artificial Intelligence - A Modern Approach, 3. Auflage, 2016, Pearson
Notes:

Course: Data-based AI
EDP designation: WINB452R
Lecturer: Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture with integrated exercise / compulsory subject in the specialization Intelligent Production Systems
Teaching language: German or English at the choice of the lecturer
Contents: • Introduction to selected machine learning algorithms (e.g. supervised learning, unsupervised learning) • Deep learning and typical applications
Recommended literature: Aurélien Géron (2019): Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. Francois Chollet (2022): Deep Learning with Python.
Notes:

WINB460R Robot Programming

Module name: *Robot Programming*

Module overview
EDP designation: WINB460R
Module coordinator(s): Prof. Dr.-Ing. Björn Hein, Prof. Dr.-Ing. Christian Wurll
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of automation and process technology
Prerequisites according to SPO: None
Competences: Students can apply different methods and concepts for programming robots by: • gaining a comprehensive overview of the design, operation and programming of industrial robots • learning programming using practical examples, • realising a large robot project in small groups, in order to be able to design and evaluate robot applications later in their professional life.
Examination: Student research project (in the form of a project paper, duration 8 weeks) and oral examination (20 minutes)
Usability:

Course: Robot Programming
EDP designation: WINB461R
Lecturer: Prof. Dr.-Ing. Björn Hein, Prof. Dr.-Ing. Christian Wurll
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture / laboratory / compulsory subject in the specialization Intelligent Production Systems
Teaching language: German
Contents: The course content is taught in a practical manner using four robot training cells from KUKA AG. An elaborated work script is available for this purpose. It is based on the training documents of the KUKA training centre and has been specially adapted for the industrial robot laboratory. It includes the following teaching content: Level 1 (2.5 CP): • Structure of robot systems • Robot operation and safety • Coordinate systems of a robot

- Point/lane programming
- Logic functions and trigger programming
- Working with spline blocks

Level 2 (CP):

- Working at expert level
- Process controls
- Data management in KRL
- Variables, fields and structures
- Sub-programmes, functions
- Message programming
- Component handling
- Palletising and depalletising
- Cycle time optimisation

After learning the above content, the lecture is followed by project work in small groups. Here, a given task is to be automated and solved with the help of the robot system.

Recommended literature:
Comprehensive script and sample tasks, specifications for project work.

Notes:
Frontal lecture (5 - 8 lecture hours), experiments in small groups according to the work script, practical realisation of the project work in small groups.
Special feature: After successfully passing the examination, it is possible to take an examination at KUKA AG and thereby obtain the certificates "Robot Programmer Level I" and "Robot Programmer Level II".

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Specialization

Sustainable Energy Management

WINB350N Industrial Energy Systems

Module name: Industrial Energy Systems

Module overview
EDP designation: WINB350N
Module coordinator(s): Prof. Dr Marco Braun, Prof. Dr Martin Fritz
Module scope (ECTS):5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of thermodynamics, electrical engineering, analogue to the corresponding modules from the 1st and 3rd semesters
Prerequisites according to SPO: None
Competences: Students gain a basic understanding of energy management in companies. They learn the necessary information to be able to operate energy management and thus save energy and energy costs and increase the security of energy supply. Students understand different energy systems and their challenges by understanding the functioning and applications of electrical machines, multiphase systems and the functioning and design of selected electrical components and apply design methods to successfully investigate, evaluate and solve problems in the areas of energy systems and optimise systems.
Examination: Written examination (90 minutes) or oral examination (40 minutes) or 2 presentations (20 minutes each) or written examination (45 minutes) and oral examination (20 minutes) or oral examination (20 minutes) and a presentation (20 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Industrial Energy Management
EDP designation: WINB351N
Lecturer: Prof. Dr Marco Braun
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Sustainable Energy Management
Teaching language: German or English
Contents, Basic knowledge with the following focal points: • Determination of potential savings and energy performance indicators (EnPI) in industrial companies • PDCA cycle

• Certification process in accordance with ISO 50001, DIN 16247-1 or EMAS • Corporate climate management • CO2 balancing (Scope 1-3) for companies
Recommended literature: Blesl, M., Kessler, A. Energieeffizienz in der Industrie, Springer Vieweg, aktuelle Auflage. Erfolgreiches Energiemanagement nach DIN EN ISO 50001:2018, Publikation Beuth Praxis 2019-10.
Notes:

Course: Electrical Components and Networks
EDP designation: WINB352N
Lecturer: Prof. Dr Martin Fritz
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject in the specialization Sustainable Energy Management
Teaching language: German
Contents: Electrical machines, multiphase systems, delta-wye conversion, power concepts, selected electrical components
Recommended literature: Literature will be announced in the lecture.
Notes:

WINB360N Sustainable Energy Management

Module name: Sustainable Energy Management

Module overview
EDP designation: WINB360N
Module coordinator(s): Prof. Dr Holger Perlwitz
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of energy markets & trading, comparable to the module of the same name
Prerequisites according to SPO: None
Competences: Students gain a basic understanding of the challenges involved in realising the goal of climate neutrality (context: Paris Climate Agreement). They will be able to describe and assess the key consequences for the entire energy value chain and for other greenhouse gas-intensive sectors. Students will be able to classify and assess the role of renewable energies and climate-neutral hydrogen in decarbonisation. This enables students to play a positive role in the implementation of climate neutrality strategies at companies, but also in the political and regulatory environment. This also creates the basis for further lectures in energy economics.
Examination: Written examination (90 minutes) or oral examination (30 minutes) or term paper (can also be carried out as project work, duration 3 weeks) and oral examination (20 minutes) or term paper (can also be carried out as project work, duration 3 weeks) and presentation (15 minutes) or presentation (duration 15 minutes) and oral examination (duration 20 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Sustainable Energy Economics (Sustainable Energy Economics)
EDP designation: WINB361N
Lecturer: Prof. Dr Holger Perlwitz, Prof. Dr Marco Braun
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory module as part of the specialization in Sustainable Energy Management
Teaching language: German or English
Contents: Imparting basic knowledge on the following topics: • Terms and concepts of sustainability in the energy industry • Climate policies, initiatives and (global) scenarios for decarbonisation

- Energy systems with a high proportion of renewable energies
- Techno-economic analysis of renewable energies
- Analysing the green hydrogen economy
- Options for decarbonisation in the energy-intensive industry
- Role of e-mobility & grid infrastructure for decarbonisation
- Importance of "critical minerals" for the energy transition
- Possible excursion and/or exchange with industry representatives

Recommended literature:
Veröffentlichungen der International Energy Agengy.
Kaltschmitt, M. et. al. (2020), Erneuerbare Energien, 6. Auflage, Springer.
Wawer (2022), Elektrizitätswirtschaft, Eine praxisorientierte Einführung in Strommärkte und Stromhandel.
Schmidt,T. (2020), Wasserstofftechnik, Hanser.
Further literature will be announced in the lecture.

Notes:

WINB450N Energy Technology

Module name: *Energy Technology*

Module overview
EDP designation: WINB450N
Module coordinator(s): Prof. Dr Marco Braun
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of technical thermodynamics
Requirements according to SPO: None
Competences: Students have a basic understanding of energy systems for fossil and renewable energy generation (power plants, wind turbines, photovoltaic systems, etc.) and conversion (heat pumps, hydrogen systems, storage systems) in order to balance, calculate and optimize real energy systems in companies and in the energy industry. Students understand the functioning of large energy systems and can extend them appropriately.
Examination: Written examination (90 minutes) or oral examination (30 minutes) or presentation (20 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Energy Technology
EDP designation: WINB451N
Lecturer: Prof. Dr Marco Braun (Prof. Dr Holger Perlwitz)
Hours per week (SWS): 4 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject
Teaching language: German or English
Contents: Imparting basic knowledge with the following focal points: • Introduction to heat transfer (convection; conduction; radiation) • Introduction to fluid mechanics • Introduction to the combustion calculation • Fossil-fuelled power generation plants and heat generation plants • Regenerative energy generation plants • Techno-economic analyses
Recommended literature: Veröffentlichungen der Energy Agengy.

Kaltschmitt, M. et. al. (2020), Erneuerbare Energien, 6. Auflage, Springer. Schmidt, T. (2020), Wasserstofftechnik, Hanser. Quaschning, V. Regenerative Energiesysteme, Hanser Verlag 2021. Further literature will be announced in the lecture.
Notes:

WINB460N Energy Markets and Trading

Module name: Energy Markets and Trading
Module overview
EDP designation: WINB460N
Module coordinator(s): Prof. Dr Holger Perlwitz
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students acquire a basic understanding of the economic and technical framework conditions, structures and interdependencies of energy markets and pricing mechanisms. They learn methods for systematically analysing issues on energy markets and in energy trading. These competences can be used correctly and safely in practice, e.g. in trading-related areas of energy companies, and create the basis for further lectures in energy economics.
Examination: Written examination (90 minutes) or oral examination (30 minutes) or term paper (can also be carried out as project work, duration 3 weeks) and oral examination (20 minutes) or term paper (can also be carried out as project work, duration 3 weeks) with presentation (15 minutes) or presentation (15 minutes) and oral examination (20 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Energy Markets and Trading
EDP designation: WINB461N
Lecturer: Prof. Dr Holger Perlwitz, Prof. Dr Reinhard Bauer
Hours per week (SWS): 4 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject as part of the specialization in Sustainable Energy Management
Teaching language: German or English
Contents: Imparting basic knowledge with the following focal points: • General conditions in the electricity industry • Generation, transmission, storage and demand of electricity • European emissions trading • Fundamentals of spot and futures markets, pricing, trading products • Electricity trading and fundamentals of risk management • Selected commodity markets (e.g. for natural gas) for the electricity industry

• Utilisation of information service providers in the energy market Possible excursion, e.g. visit to a power plant, trading floor or E-World
Recommended literature: Wawer, T. (2022): Elektrizitätswirtschaft, Eine praxisorientierte Einführung in Strommärkte und Stromhandel, Springer/Gabler Verlag. Weber, C, Möst, D., Fichtner, W: (2022), Economics of Power Systems, Springer Verlag. Schiffer, H.W. (2019): Energiemarkt Deutschland, Springer Verlag. Further references will be given in the lecture.
Notes:

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Specialization

Innovation and Technology Entrepreneurship

WINB350X Project: Prototyping and Validation of Business Ideas

Module name: Project: Prototyping and Validation of Business Ideas

Module overview
EDP designation: WINB350X
Module coordinator(s): Prof. Dr Anna Heszler
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of general business administration and marketing, comparable to the courses of the same name
Prerequisites according to SPO: None
Competences: Students are able to review the chances of success of an existing, innovative business idea with relevant potential customers and stakeholders and develop it further in a success-oriented manner by using the methods of design thinking, lean startup and (rapid) prototyping and continuously validate or falsify previously formulated hypotheses in dialogue with potential customers and continuously incorporate the findings into the further development of the business idea in order to be able to develop innovative business ideas into viable business models in their professional activities.
Examination: Student research project (in the form of a portfolio, duration 10 weeks) or student research project (can also be carried out in the form of a project, duration four weeks). The exact form of examination will be announced at the beginning of the course.
Usability: The module is also offered in the specialization Innovation and Entrepreneurship in the Bachelor's degree programme in Business Management.

Course: Project: Project: Prototyping and Validation of Business Ideas
EDP designation: WINB351X
Lecturer: Prof. Dr Anna Heszler (Deputy: Prof. Dr Carsten Hahn)
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Seminar / compulsory subject in the specialization Innovation and Entrepreneurship
Teaching language: German or English
Contents: • Introduction to design thinking, lean startup and (rapid) prototyping • Introduction to the existing business idea

- Continuous development of prototypes and validation (and, if necessary, further development) of the existing business idea

Recommended literature:

Bland, D./ Osterwalder, A. (2020): Testing Business Ideas: Mit kleinem Einsatz durch schnelle Experimente zu großen Gewinnen.
Blank, S. (2020): The Four Steps to the Epiphany: Successful Strategies for Products that Win.
Blank, S./ Dorf, B. (2017): Das Handbuch für Startups – Schritt für Schritt zum erfolgreichen Unternehmen.
Christensen, C. M. (2016): The Innovator's Dilemma.
Fitzpatrick, R. (2016): Der Mom Test – Wie Sie Kunden richtig interviewen und herausfinden, ob Ihre Geschäftsidee gut ist – auch wenn Sie dabei jeder anlügt.
Gassmann, O./ Frankenberger K./ Csik, M. (2017): Geschäftsmodelle entwickeln - 55 innovative Konzepte mit dem St. Galler Business Model Navigator.
Osterwalder, A./ Pigneur, Y. (2011): Business Model Generation - Ein Handbuch für Visionäre, Spielveränderer und Herausforderer.
Osterwalder, A./ Pigneur, Y./ Bernarda, G./ Smith, A. (2015): Value Proposition Design.
Ries, E. (2014): Lean Startup - Schnell, risikolos und erfolgreich Unternehmen gründen.

Notes:

WINB360X Developing and Implementing

Module name: *Developing and Implementing*

Module overview
EDP designation: WINB360X
Module coordinator(s): Prof. Dr Claas Christian Wuttke
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of operational and technical contexts and processes comparable to the course "General Business Administration" and the module "Production and Quality"
Prerequisites according to SPO: None
Competences: Students are able to plan and manage the implementation of new business ideas in an interdisciplinary manner by selecting suitable methods, in particular development, quality and project management, in order to develop business ideas into concrete goods and services that can be provided with the available resources and networks. Students are familiar with the technological and legal requirements (in particular product liability) for the development of new goods and services and are thus able to utilise and sustainably protect their own company's know-how.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: Also suitable for the Innovation and Entrepreneurship specialization in the Business Management degree programme.

Course: Developing and Implementing
EDP designation: WINB360X
Lecturer: Prof. Dr Claas Christian Wuttke, Substitute: Prof. Dr Hendrik Rust
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture - flipped classroom / compulsory subject in the specialization Innovation and Technology Entrepreneurship
Teaching language: German or English
Contents: • Differentiation between goods and services, portfolio management • Methods and organisation of product development, model-based product development • Integration of internal and external stakeholders, quality and project management • Technology management and legal aspects • Systematic development of data-based services

Recommended literature:

Cooper, R. G. (2010): Top oder Flop in der Produktentwicklung. Erfolgsstrategien: Von der Idee zum Launch. 2. Auflage, Weinheim: WILEY-VCH.
Schlattmann, J.; Seibel, A. (2017): Aufbau und Organisation von Entwicklungsprojekten: Berlin [u. a.]: Springer.
Ehrenspiel, K.; Meerkamm, H. (2017): Integrierte Produktentwicklung: Denkabläufe, Methodeneinsatz, Zusammenarbeit. München: Hanser.
Eisenberg, C.; Gildeggen, R.; Reuter, A.; Willburger, A. (2014) Produkthaftung. Kompaktwissen für Betriebswirte, Ingenieure und Juristen. München: Oldenbourg.
Gassmann, O.; Bader, M. (2017): Patentmanagement. Innovationen erfolgreich nutzen und schützen. Berlin [u. a.]: Springer Gabler.
Gerl, S. (2020): Innovative Geschäftsmodelle für industrielle Smart Services. Ein Vorgehensmodell zur systematischen Entwicklung. Wiesbaden: Springer Gabler.
Gochermann, J. (2020): Technologiemanagement. Technologien erkennen, bewerten und erfolgreich einsetzen. Wiesbaden: Springer.
Jantzer, M.; Nentwig, G.; Deininger, C.; Michl, T. (2019): Die Kunst, eine Produktentwicklung zu führen. Erfolgreiche Konzepte aus der Unternehmenspraxis Wiesbaden: Springer Vieweg.
Neudörfer, A. (2021): Konstruieren sicherheitsgerechter Produkte. Methoden und systematische Lösungssammlungen zur EG-Maschinenrichtlinie. Wiesbanden: Springer-Vieweg.
Scheer, A.-W. (2020): Unternehmung 4.0. Vom disruptiven Geschäftsmodell zur Automatisierung der Geschäftsprozesse. Wiesbanden: Springer Gabler.
Scholz, U. et al. (2018): Praxishandbuch Nachhaltige Produktentwicklung. Berlin [u. a.]. Springer Gabler
Timinger, H. (2017): Modernes Projektmanagement. Mit traditionellem, agilem und hybridem Vorgehen zum Erfolg. Weinheim: Whiley-VCH.
Vajna, S.; Weber, C.; Zeman, K.; Hehenberger, P.; Gerhard, D.; et al. (2018): CAx für Ingenieure. Wiesbaden: Springer-Vieweg.
Wuttke, C.C. et al. (2016): Adaptable and Customizable Development Process for Product-Service-Systems. Procedia CIRP No. 47, 317 – 322.
Wuttke, C.C. et al. (2018): Systematic Prototyping of Product-Service Systems. Procedia CIRP No. 73, 50 – 55.
Wuttke, C.C. et al. (2019): Individualized Customer Integration Process for the Design of Industrial Product-Service-Systems. Procedia CIRP 63, p. 83–88.
Wuttke, C.C. et al. (2020): Strategic planning of continuous stakeholder involvement in the design of industrial product-service systems. IET Collaborative Intelligent Manufacturing 2 (3), p. 123-131.

Notes:

WINB450X Project: Developing Business Ideas

Module name: Project: Developing Business Ideas

Module overview
EDP designation: WINB450X
Module coordinator(s): Prof. Dr Anna Heszler
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of general business administration and marketing, comparable to the modules of the same name
Prerequisites according to SPO: None
Competences: Students can apply innovation and creativity techniques to a real, challenging situation (e.g. in a company, association or community/city) in a problem- and solution-oriented manner by using the user- and customer-centred, iterative procedures and processes (especially design thinking) discussed in the course by first placing the customer and user at the centre and then developing initial ideas in a solution-oriented manner, designing simple prototypes and testing them with users or customers and drawing conclusions from the results in order to be able to systematically develop innovative solutions and business ideas for problems in their professional activities.
Examination: Student research project (in the form of a portfolio, duration 10 weeks) or student research project (also possible in the form of a project, duration 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability: The module is also offered in the specialization Innovation and Entrepreneurship in the Bachelor's degree programme in Business Management.

Course: Project: Developing Business Ideas
EDP designation: WINB451X
Lecturer: Prof. Dr Anna Heszler (Deputy: Prof. Dr Carsten Hahn)
Hours per week (SWS): 4 SWS
Availability: annually in the winter semester
Type and mode: Seminar / compulsory subject in the specialization Innovation and Technology Entrepreneurship)
Teaching language: German or English
Contents: • Development of initial business ideas (especially with the Design Thinking method) for a relevant practical challenge • Familiarisation with and use of various creativity techniques • Developing simple prototypes and initial tests of the resulting business idea

Recommended literature:

Bland, D./ Osterwalder, A. (2020): Testing Business Ideas - Mit kleinem Einsatz durch schnelle Experimente zu großen Gewinnen.
Brown, T. (2008): Design Thinking, Harvard Business Review, 86(6), 84-95.
Brown, T. (2019): Change by Design - How Design Thinking Transforms Organizations and Inspires Innovation.
Fitzpatrick, R. (2016): Der Mom Test – Wie Sie Kunden richtig interviewen und herausfinden, ob Ihre Geschäftsidee gut ist – auch wenn Sie dabei jeder anlügt.
Gassmann, O./ Frankenberger K./ Csik, M. (2017): Geschäftsmodelle entwickeln - 55 innovative Konzepte mit dem St. Galler Business Model Navigator.
Gray, D. (2011): Gamestorming – Ein Praxisbuch für Querdenker, Moderatoren und Innovatoren.
Knapp, J./ Zeratsky, J./ Kowitz, B. (2016): Sprint – How to Solve Big Problems and Test New Ideas in Just Five Days.
Osterwalder, A./ Pigneur, Y. (2011): Business Model Generation - Ein Handbuch für Visionäre, Spielveränderer und Herausforderer.
Osterwalder, A./ Pigneur, Y./ Bernarda, G./ Smith, A. (2015): Value Proposition Design.

Notes:

WINB460X Entrepreneurship

Module name: Entrepreneurship

Module overview
EDP designation: WINB460X
Module leader(s): Prof. Dr Carsten H. Hahn
Modulumfang (ECTS): 5 CP (45 Stunden Präsenzveranstaltungen und 105 Stunden Selbststudium einschließlich Prüfungsvorbereitung)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students can name the differences between entrepreneurship, intrapreneurship and corporate entrepreneurship by explaining and differentiating the aforementioned models in order to be able to contribute to solving entrepreneurial tasks and challenges within and outside a company.
Examination: Student research project (also possible in the form of a project, 4 weeks). The exact form of examination will be announced at the beginning of the course.
Usability: The module is also offered in the specialization Innovation and Technology Entrepreneurship in the Bachelor's degree programme in Business Management.

Course: Entrepreneurship
EDP designation: WINB461X
Lecturer: Prof. Dr Carsten H. Hahn (Deputy: Prof. Dr Anna Heszler)
Hours per week (SWS): 4 SWS
Availability: annually in the winter semester
Type and mode: Seminar / compulsory subject in the specialization Innovation and Technology Entrepreneurship
Teaching language: German or English
Contents: • Introduction to basic concepts of entrepreneurship • Introduction to intrapreneurship and corporate entrepreneurship • Development of business models and patterns
Recommended literature: https://www.edx.org/course/becoming-an-entrepreneur Aulet B.: Disciplined Entrepreneurship (2013): 24 Steps to a Successful Startup Tidd, J. R. und Bessant, J. (2015): Innovation and Entrepreneurship. Chichester: John Wiley & Sons. 3. Aufl. Drucker, P.: Innovation and Entrepreneurship. New York: Harper Business (Reprint), 2006

Blank, S., Dorf, B. (2017): Das Handbuch für Startups – Schritt für Schritt zum erfolgreichen Unternehmen. Christensen, C. M. (2016): The Innovator's Dilemma. Gassmann, O., Frankenberger K., Csik, M. (2017): Geschäftsmodelle entwickeln - 55 innovative Konzepte mit dem St. Galler Business Model Navigator. Osterwalder, A., Pigneur, Y. (2011): Business Model Generation - Ein Handbuch für Visionäre, Spielveränderer und Herausforderer. Osterwalder, A., Pigneur, Y., Bernarda, G., Smith, A. (2015): Value Proposition Design Ries, E. (2015): Lean Startup - Schnell, risikolos und erfolgreich Unternehmen gründen.
Notes:

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Specialization

Production Management

WINB350K Digital Product Development

Module name: Digital Product Development

Module overview
EDP designation: WINB350K
Module coordinator(s): Prof. Dr.-Ing Hendrik Rust
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students acquire the skills required to develop and successfully implement innovative ideas in digital products and systems. They master the design and implementation of products on various platforms as well as the creation of prototypes and applications using modern technologies. Students have a basic understanding of user research, the testing of digital products and can apply UX design principles. They are able to effectively manage and present the development of digital products.
Examination: Written exam (90 minutes) or oral exam (30 minutes) or term paper (in the form of a project, duration 4 weeks). The exact form of examination will be announced at the beginning of the course.
Usability:

Course: Digital Product Development
EDP designation: WINB351K
Lecturer: Prof. Dr Hendrik Rust (Prof. Dr.-Ing Christian Wurll)
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Production Management
Teaching language: German or English
Contents: The course deals with the technical and creative aspects of developing digital products. The focus is on the various phases of product development, ranging from brainstorming and design to the realisation of a digital product. Students gain insights into the methods of project management in order to carry out successful digital projects and are taught the basics of user- and customer-centred development. The acquired knowledge is summarised and applied in a project.
Recommended literature: Hoffmann, S. (2020): Digitales Produktmanagement: Methoden – Instrumente Praxisbeispiele. Springer (E-Book).

Notes:

Course: Fundamentals of Product Development
EDP designation: WINB352K
Lecturer: Prof. Dr Hendrik Rust (Prof. Dr.-Ing Christian Wurll)
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Production Management
Teaching language: German or English
Contents: In the lecture "Fundamentals of Product Development", students gain an understanding of the basic concepts and methods of product development and can apply them to effectively develop products. Students will gain an insight into the processes involved in developing a product, including planning, design, testing, manufacturing and market launch. Both technical and business aspects are considered. Special emphasis is placed on the early phase and success factors of product development.
Recommended literature: Vahs, D. und Brem, A. (2015). Innovationsmanagement: von der Idee zur erfolgreichen Vermarktung. Schäffer-Poeschel. Ehrlenspiel, A., Lindemann, U., u.a. (2020). Kostengünstig Entwickeln und Konstruieren: Kostenmanagement bei der integrierten Produktentwicklung. Springer (E-Book). Labisch, S. und Wählisch, G. (2020). Technisches Zeichnen: Selbstständig lernen und effektiv üben. Rust, H. (2023). Erfolgsfaktoren der Produktentwicklung. Springer (E-Book).
Notes:

WINB360K Automation

Module name: *Automation*

Module overview
EDP designation: WINB360K
Module coordinator(s): Prof. Dr.-Ing. Christian Wurll, Prof. Dr.-Ing. Björn Hein
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of electrical engineering, semiconductor technology and technical mechanics
Prerequisites according to SPO: None
Competences: Participants will be able to design control systems for automation tasks by: a) understanding the modelling of technical processes, b) Knowing the components and structures of automation, c) having a comprehensive overview of sensors and actuators, d) learning how to programme with IEC 61131-compatible controllers, for example, in order to be able to communicate competently and "on an equal footing" with engineers from other disciplines and make joint decisions later in their careers.
Examination: Written examination (90 minutes) or term paper (in the form of a project, duration 4 weeks) + oral examination (20 minutes) or oral examination (45 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Automation
EDP designation: WINB361K
Lecturer: Prof. Dr.-Ing. Christian Wurll, Prof. Dr.-Ing. Björn Hein
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Production Management
Teaching language: German
Contents: The general structure of automation systems is considered and the sensors (measurement technology, signal processing, the most important analogue and digital sensors) and actuators (mechanical, pneumatic, electrical and mechatronic actuators) typically used there are discussed. The lecture concludes with an introduction to PLC programming and an insight into the use of robot systems in industrial applications.
Recommended literature (in the current edition): Comprehensive script. Textbooks: Heinrich et. Al. "Grundlagen Automatisierung".

Lauber, Göhner: "Prozessautomatisierung“.
Notes: Frontal lecture, supplemented by notes for examples and exercises. An extensive collection of questions for self-checking concludes each chapter. Animations, numerous videos and illustrative samples are also available.

WINB450K Technical Systems, Components and Processes

Module name: Technical Systems, Components and Processes
Module overview
EDP designation: WINB450K
Module coordinator(s): Prof. Dr Florian Finsterwalder, Prof. Dr Martin Fritz
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of automation, power engineering, electrical engineering, control engineering
Prerequisites according to SPO: None
Competences: *Sustainable process engineering:* • Students understand the fundamentals of heat and mass transfer and can apply these to the calculation and design of process engineering systems and apparatus. Students are able to recognise thermal separation problems, systematically develop solutions and design the corresponding processes for separation. They will have mastered methods for characterising solid particles and will be able to evaluate corresponding measurement results, for example to carry out risk assessments. They will be able to design processes for material preparation tasks on the basis of acquired knowledge of mechanical, thermal and chemical process engineering and integrate these into corresponding systems, for example cleaning systems. • Students have a basic understanding of the kinetics of chemical reactions and can use this to carry out simple reactor calculations, for example for material conversion. Students are able to visualise process engineering processes clearly and comprehensibly with the help of flow diagrams. Students understand the importance of critical raw materials for high-tech products and can evaluate common recycling processes. They recognise the necessity of recycling for sustainable economic activity. With the help of ecological and cost balances, students can assess different recycling methods. Cyberphysical systems: • Students can assess, design and expand technical applications of networked systems by having basic knowledge from selected areas such as sensor technology, radio modules/networks, data management, computer architecture, understanding the functionality of components and systems and being able to apply this knowledge in order to be able to discuss competently with people from this environment.

Examination: Written examination (90 minutes) or term paper (duration 4 weeks) and oral examination (30 minutes) or oral examination (60 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Cyberphysical Systems
EDP designation: WINB451K
Lecturer: Prof. Dr Martin Fritz
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject in the specialization Production Management
Teaching language: German
Contents: Depending on the focus set, selected topics from sensor technology, wave propagation, radio technology (multiplex, modulation and re-transmission methods), data storage, interfaces and/or computer architecture (microprocessor, microcontroller).
Recommended literature: Will be announced at the beginning of the semester.
Notes:

Course: Sustainable Process Engineering
EDP designation: WINB452K
Lecturer: Prof. Dr Florian Finsterwalder (Prof. Dr Christoph Roser)
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject in the specialization Production Management
Teaching language: German
Contents: • Industrial significance of process engineering • Fundamentals of heat and mass transfer • Mechanical process engineering: particle size distributions, solid comminution, separation processes, solid-liquid separation, mixing processes, process examples • Thermal process engineering: evaporation, distillation, extraction, adsorption/desorption, process examples • Chemical process engineering: kinetics, ideal stirred tank reactors, ideal flow tube, basics for describing real reactors, examples of electrochemical processes, e.g. electrolysis • Flow diagrams • Sensors, switching and control elements • Case studies and selected system concepts • Economic considerations: Material flows and energy balances

- Recycling: material types and types of waste, critical raw materials, recycling routes, life cycle assessments, economic efficiency criteria, examples of technically realised recycling processes
- Excursion: Visit to process engineering plants (e.g. refinery, cement plant, water treatment, recycling plant)

Recommended literature (in the current edition):
Werner Hemming, Walter Wagner, Verfahrenstechnik, Vogel Business Media, ISBN 978-3-8343-3412-1.
Karl Schwister, Volker Leven, Verfahrenstechnik für Ingenieure, Hanser-Verlag.
Hans Martens, Daniel Goldmann, Recyclingtechnik: Fachbuch für Lehre und Praxis, Springer-Vieweg, ISBN 978-3658027858.

Notes:

WINB460K Operational Excellence

Module title: *Operational Excellence*

Module summary
Module code: WINB460K
Module coordinator: Prof. Dr Christoph Roser
Credits (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Semester: 3rd or 4th curriculum semester
Pre-requisites with regard to content: Basics of manufacturing, logistics
Pre-requisites according to the examination regulations: None
Competences: The students know the basic objectives of manufacturing and logistics (safety, cost, quality, time). They can optimise production and do Kaizen to improve these basic objectives and contribute to the success of the company. For this they also know the influence of inventory on costs and lead times and the fundamentals of production control (plan control, consumption control). They also know and the influence and management of waste, variation and overload in production and logistics. To improve the operations, they also know the main methods for continuous improvement and the procedure for the implementation of improvement projects.
Assessment: Written exam (90 minutes) or oral exam (30 minutes) or term paper (can be carried out as project report, duration 4 weeks). The specific form of examination will be announced at the beginning of the lecture.
Usability:

Course: Operational Excellence
Module code: WINB461K
Lecturer: Prof. Dr Christoph Roser
Contact hours: 4 semester hours per week
Availability: Annually (summer semester). Possibly also every semester, if the students are very interested and there is a sufficient number of participants
Type/mode: Lecture / obligatory in the specialization production management
Language of instruction: English (if required German)
Content: Objectives of production and logistics (safety, cost, quality, time). Influence of waste, variability, and overload on goals. Selection of methods to improve these goals such as Lean Manufacturing, Consumption Control, Kanban, Total Quality Management, 5S, Visual Management, SMED, Customer Takt and cycle time, Leveling, Just in Time, Just in Sequence, Ship to Line, Poka Yoke, Standard Work, Value Stream Mapping, Six Sigma, etc....

Continuous improvement project approach including team building, root cause analysis, and PDCA.
Recommended reading: Blog AllAboutLean.com
Comments:

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Specialization

Supply Chain Management

WINB350S Intralogistics

Module name: *Intralogistics*

Module overview
EDP designation: WINB350S
Module coordinator(s): Prof. Dr Christian Wurll,
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Basic knowledge of automation and process technology
Requirements according to SPO: None
Competences: Students can apply the various methods and concepts for identifying products, storing, sorting and picking goods. The new programme provides a comprehensive overview of the state of the art and research in the field of intralogistics. Students get to know and analyse selected case studies and practical examples and develop exemplary solutions in order to be able to design and evaluate intralogistical solutions from customer-specific requirements at a later point.
Examination: Written examination (90 minutes) or term paper (in the form of a project, duration 4 weeks) + oral examination (20 minutes) or oral examination (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Intralogistics
EDP designation: WINB351S
Lecturer: Prof. Dr.-Ing. Christian Wurll
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Supply Chain Management
Teaching language: German
Contents: 1. Overview, limits and current development trends in material flow technology 2. Concepts, content, trends, fields of application and challenges in the field of digitalization (Industry 4.0, Internet of Things) 3. Identification systems and packaging types 4. Conveyor technology, continuous conveyors, discontinuous conveyors, automated guided vehicles (AGVs) Storage and racking types, storage functions, storage types and systems

5. Basics and technical components of order picking systems
Recommended literature: Materialflusssysteme, ten Hompel (2018), Handbuch Industrie 4.0 Band 3: Logistik (2020) Fahrerlose Transportsystem, Ullrich (2023), Warehousing 4.0 (2017).
Notes:

WINB360S Planning and Control of Complex Logistics Networks

Planning and control of complex logistics networks

Module overview
EDP designation: WINB360S
Module coordinator(s): Prof. Dr Claas Christian Wuttke
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of general business administration, logistics, production and quality
Prerequisites according to SPO: None
Competences: The students can: • formulate a technology strategy and plan measures for implementation by selecting and applying suitable technology management methods appropriate to the situation, • formulate a strategy for the optimal design and economic utilisation of complexity for your area and plan measures for implementation by using methods to determine and evaluate both internal complexity and the boundary conditions that determine complexity. • formulate and justify approaches to optimising processes for planning new or redesigning existing logistics systems by evaluating existing planning procedures with the concepts and potential of the digital factory. In order to design an effective logistics system for your company and integrate it into logistics networks in such a way that the company's objectives are achieved in a sustainable and robust manner.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: The module is also offered as BWLB360S in the Supply Chain Management specialization of the Business Management degree programme.

Course: Planning and Control of Complex Logistics Networks
EDP designation: WINB361S
Lecturer: Prof. Dr Claas Christian Wuttke, Substitute: Prof. Dr Christoph Roser
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture - inverted classroom / compulsory subject as part of the Supply Chain Management specialization

Teaching language: German

Contents:

Among other things:

- Concepts and methods of supply chain management
- Digitally supported planning of value-adding systems (digital factory)
- Complexity management and variant management
- Technology management for logistics systems
- Management of continuous improvement

Recommended literature:

Arnold, D.; Furmans, K.(2019): Materialfluss in Logistiksystemen. Springer Vieweg.
Becker, T. (2018): Prozesse in Produktion und Supply Chain optimieren. Springer Vieweg.
Bracht, U. (2018): Digitale Fabrik: Methoden und Praxisbeispiele. Springer Vieweg.
Furmans, K.; Kilger, C.(2019): Betrieb von Logistiksystemen. Springer Vieweg.
Gudehus, T. (2012): Logistik 2: Netzwerke, Systeme und Lieferketten. Springer Vieweg.
Hausladen, I. (2020): IT-gestützte Logistik: Systeme - Prozesse – Anwendungen. Springer Gabler.
Lasch, R. (2021): Strategisches und operatives Logistikmanagement: Prozesse. Springer Gabler.
Klug, F. (2018): Logistikmanagement in der Automobilindustrie. Springer Vieweg.
Mayer G. et al. (2020): Ablaufsimulation in der Automobilindustrie. Springer Vieweg.
Schulte, C. (2017): Logistik – Wege zur Optimierung der Supply Chain. Vahlen.
ten Hompel, M.; Bauernhansl, T. (2020) Handbuch Industrie 4.0: Band 3: Logistik. Springer Vieweg.

Notes:

WINB450S Introduction to Artificial Intelligence

Module name: *Introduction to Artificial Intelligence*

Module overview
EDP designation: WINB450S
Module coordinator(s): Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Mathematical and computer science knowledge comparable to the modules Computer Science I and II, Mathematics for Engineers I and II
Prerequisites according to SPO: None
Competences: Students have an overview of methods of model-based and data-based artificial intelligence. Students have a deeper insight into some exemplary methods of artificial intelligence by implementing them themselves in a suitable higher programming language in order to supplement their theoretical knowledge with practical experience. Students are able to analyse real-world applications with regard to artificial intelligence methods by abstracting tasks, formulating requirements and identifying suitable AI methods in order to assess potential in the operational environment and initiate, accompany, control or monitor implementation projects.
Examination: Written exam (90 minutes) or oral exam (30 minutes) or practical work (duration 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Introduction to Artificial Intelligence
EDP designation: WINB451S
Lecturer: Prof. Dr Reinhard Bauer, Prof. Dr Andreas Wagner
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture with integrated exercise / compulsory subject in the specialization Supply Chain Management
Teaching language: German or English
Contents: • Basic artificial intelligence techniques (e.g. searching, dynamic programming and decision trees) • Classic planning and problem solving • Logic, knowledge systems and inference • Machine learning (e.g. supervised learning, unsupervised learning, reinforcement learning)

• Optimisation (e.g. mathematical optimisation, constraint programming, metaheuristics)
Recommended literature: Stuart, Norvig: Artificial Intelligence - A Modern Approach, 3. Auflage, 2016, Pearson.
Notes:

WINB460S Operational Excellence

Module title: *Operational Excellence*
Module summary
Module code: WINB460S
Module coordinator: Prof. Dr Christoph Roser
Credits (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Semester: 3rd or 4th curriculum semester
Pre-requisites with regard to content: Basics of manufacturing, logistics
Pre-requisites according to the examination regulations: None
Competences: The students know the basic objectives of manufacturing and logistics (safety, cost, quality, time). They can optimise production and do Kaizen to improve these basic objectives and contribute to the success of the company. For this they also know the influence of inventory on costs and lead times and the fundamentals of production control (plan control, consumption control). They also know and the influence and management of waste, variation and overload in production and logistics. To improve the operations they also know the main methods for continuous improvement and the procedure for the implementation of improvement projects.
Assessment: Written exam (90 minutes) or oral exam (30 minutes) or term paper (student project, duration 4 weeks). The specific form of examination will be announced at the beginning of the lecture.
Usability:

Course: Operational Excellence
Module code: WINB461S
Lecturer: Prof. Dr Christoph Roser
Contact hours: 4 semester hours per week
Availability: Annually (summer semester). Possibly also every semester, if the students are very interested and there is a sufficient number of participants
Type/mode: Lecture/obligatory in the specialization Supply Chain Management
Language of instruction: English (if required German)
Content: Objectives of production and logistics (safety, cost, quality, time). Influence of waste, variability, and overload on goals. Selection of methods to improve these goals such as Lean Manufacturing, Consumption Control, Kanban, Total Quality Management, 5S, Visual Management, SMED, Customer Takt and cycle time, Leveling, Just in Time, Just in Sequence, Ship to Line, Poka Yoke, Standard Work, Value Stream Mapping, Six Sigma, etc....

Continuous improvement project approach including team building, root cause analysis, and PDCA.
Recommended reading: Blog AllAboutLean.com
Comments:

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Specialization

Management of Sustainable Product Development

WINB350H Sustainable Product Development

Module name: Sustainable Product Development

Module overview
EDP designation: WINB350H
Module coordinator(s): Prof. Dr.-Ing Hendrik Rust
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: none
Prerequisites according to SPO: None
Competences: Students gain an in-depth understanding of the principles and processes of sustainable product development, including the ecological, social and economic aspects. They can apply methods and techniques of sustainable product development to find a sustainable solution for a product or technology. Students can assess the ecological, social and economic impact of a product on the environment and society and make decisions on the sustainable development of a product and monitor their implementation. They are able to assess the costs and benefits of a sustainable product and put forward arguments in favour of sustainable product development. Students can put their knowledge and understanding of sustainable product development into practice.
Examination: Written examination (90 minutes), oral examination (30 minutes) or term paper (in the form of a project, duration 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Fundamentals of Product Development
EDP designation: WINB351H
Lecturer: Prof. Dr Hendrik Rust (Prof. Dr.-Ing Christian Wurll)
Hours per week (SWS): 2
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Management of Sustainable Product Development
Teaching language: German or English
Contents: In the lecture "Fundamentals of Product Development", students gain an understanding of the basic concepts and methods of product development and can apply them to effectively develop products.

Students will gain an insight into the processes involved in developing a product, including planning, design, testing, manufacturing and market launch. Both technical and business aspects are taken into account. Special focus is placed on the early phase and success factors of product development.
Recommended literature: Vahs, D. und Brem, A. (2015). Innovationsmanagement: von der Idee zur erfolgreichen Vermarktung. Schäffer-Poeschel. Ehrlenspiel, A., Lindemann, U., u.a. (2020). Kostengünstig Entwickeln und Konstruieren: Kostenmanagement bei der integrierten Produktentwicklung. Springer (E-Book). Labisch, S. und Wählisch, G. (2020). Technisches Zeichnen: Selbstständig lernen und effektiv üben. Rust, H. (2023). Erfolgsfaktoren der Produktentwicklung. Springer (E-Book).
Notes:

Course: Sustainable Product Development
EDP designation: WINB352H
Lecturer: Prof. Dr Hendrik Rust (Prof. Dr.-Ing Christian Wurll)
Hours per week (SWS): 2
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Sustainable Product Development
Teaching language: German or English
Contents: The lecture "Sustainable Product Development" deals with the principles and methods that should be applied in the development of sustainable products. The content of the lecture includes the use of environmentally friendly materials and renewable energies, energy-efficient design and the development of products with a long service life. Furthermore, factors such as disposal, reuse and recycling are analysed. In the further course of the lecture, special attention is paid to the consideration of economy, environment and society in product development. The acquired knowledge is summarised and applied in a project.
Recommended literature: Schuh, G. (2021): Sustainable Innovation: Nachhaltig Werte schaffen. Springer (E-Book).
Notes:

WINB360H Development of Digital Products and Services

Development of Digital Products and Services

Module overview
EDP designation: WINB360H
Module coordinator(s): Prof. Dr Claas Christian Wuttke
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of general business administration, production and quality
Prerequisites according to SPO: None
Competences: Students are be able to select suitable methods and processes for determining market requirements (customer integration) and the technological framework conditions (technology management) according to the situation and apply them professionally in order to systematically develop new data-based products and services and implement them in a marketable manner. Students are able to plan and manage development in an interdisciplinary manner by applying the concepts and methods of integrated and model-based product development in order to develop holistic business models that ensure the company's long-term success.
Examination: Written exam (90 minutes) or oral exam (30 minutes). The specific form of examination will be announced at the beginning of the course.
Usability: Also suitable for the Business Management degree programme in the specialization "Innovation & Entrepreneurship".

Course: Logistics
EDP designation: WINB361H
Lecturer: Prof. Dr Claas Christian Wuttke, Substitute: Prof. Dr Christian Braun
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Lecture - flipped classroom / compulsory course in the specialization Management of Sustainable Product Development
Teaching language: German or English
Contents: • Product definition, product life cycle, product and portfolio management. • Methods, processes and organisation of product development • Integrated product development and customer involvement • Innovation and technology management

- Business models for smart products and smart services

Recommended literature: e.g.

Aumayr, K. J. (2019): Erfolgreiches Produktmanagement – Toolbox für das professionelle Produktmanagement und Produktmarketing. 5. Auflage. Gabler.

Ehrenspiel, K.; Meerkamm, H. (2017): Integrierte Produktentwicklung: Denkabläufe, Methodeneinsatz, Zusammenarbeit. Hanser.

Gassmann, O., Frankenberger, K., Csik, M. (2017): Geschäftsmodelle entwickeln. 55 innovative Konzepte mit dem St. Galler Business Model Navigator. Hanse.r

Gochermann, J. (2020): Technologiemanagement. Technologien erkennen, bewerten und erfolgreich einsetzen. Springer.

Graner, Marc (2015): Methodeneinsatz in der Produktentwicklung. Bessere Produkte, schnellere Entwicklung, höhere Gewinnmargen. Springer Gabler.

Lewrick, M.; Link, P.; Liefer, L. (2017): Das Design Thinking Playbook. Mit traditionellen, aktuellen und zukünftigen Erfolgsfaktoren. Vahlen.

Osterwalder, A.; Pigneur, Y. (2011): Business Model Generation. Campus.

Osterwalder, A.; Pigneur, Y.; Bernarda, G.; Smith, A. (2015): Value Proposition Design. Campus.

Preußig, J. (2015): Agiles Projektmanagement. Scum, Use Cases, Task Boards &Co. Haufe.

Schlattmann, J.; Seibel A. (2017): Aufbau und Organisation von Entwicklungsprojekten. Springer.

Wuttke, C.C. et al. (2016): Adaptable and Customizable Development Process for Product-Service-Systems. Procedia CIRP No. 47, 317 – 322.

Wuttke, C.C. et al. (2018): Systematic Prototyping of Product-Service Systems. Procedia CIRP No. 73, 50 – 55.

Wuttke, C.C. et al. (2019): Individualized Customer Integration Process for the Design of Industrial Product-Service Systems. Procedia CIRP 63, p. 83–88.

Wuttke, C.C. et al. (2020): Strategic planning of continuous stakeholder involvement in the design of industrial product-service systems. IET Collaborative Intelligent Manufacturing 2 (3), p. 123-131.

Notes:

BLWB450H Creativity and Innovation Methods

Module name: Creativity and Innovation Methods

Module overview
EDP designation: WINB450H
Module coordinator(s): Prof. Dr Carsten H. Hahn
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: None
Prerequisites according to SPO: None
Competences: Students are able to define the most important dimensions, characteristics, functions and drivers of innovation and entrepreneurship. Students are familiar with a variety of creativity techniques and are able to apply these to a complex problem and moderate them in a targeted manner in a group in order to systematically develop product and business model innovations.
Examination: Term paper (can also be completed in the form of a project paper, 4 weeks). The exact form of examination will be announced at the beginning of the course.
Usability: This module is also offered in the specialization in Consulting in the Bachelor's degree programme in Business Management.

Course: Creativity and Innovation Methods
EDP designation: WINB450H
Lecturer: Prof. Dr Carsten H. Hahn (Deputy: Prof. Dr Hendrik Rust)
Hours per week (SWS): 4
Availability: annually in the winter semester
Type and mode: Seminar / compulsory subject in the specialization Management of Sustainable Product Development
Teaching language: German or English
Contents: • Introduction to the topic of creativity, product, process, service and business model innovation • Introduction to current methods and techniques (635 method, De Bono hats, Advocatus Diaboli, Walt Disney method) for developing and selecting ideas • Characterising user-centred, iterative and interdisciplinary innovation approaches
Recommended literature: Tidd, J. R. und Bessant, J. (2015): Innovation and Entrepreneurship. Chichester: John Wiley & Sons. 3. Aufl.

Drucker, P. (2006): Innovation and Entrepreneurship. New York: Harper Business (Reprint).
Hauschildt J., Salomo S., Schultz C. D. und Kock A. (2016): Innovationsmanagement. Vahlen.
Blair, S., Rillo, M. und Dröge, J. (2019): Serious Work: Meetings und Workshops mit der Lego® Serious Play® Methode moderieren. Vahlen.
De Bono, E. (2002): De Bonos neue Denkschule, mvg Verlag.
Kelley, T. und Kelley (2013): Creative confidence: Unleashing the creative potential within us all. New York: Crown Business.
Higgins, J. M. (2006): 101 Creative Problem Solving Techniques. New Management Publishing Company. Master Innovation und Entrepreneurship - IUE Sommersemester 2022 12.
Von Aerssen, B. und Bucholz, C. (2018): Das große Handbuch Innovation: 555 Methoden und Instrumente für mehr Kreativität und Innovation im Unternehmen. Vahlen.
Lewrick, Michael, Patrick Link and Larry Leifer (2018): The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems. Hoboken: Wiley.
Lewrick, M., Link, P. und Leifer, L. (2020): The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods. Hoboken: Wiley.
Dark Horse Innovation (2016): Digital Innovation Playbook. Murmann Publishers.
Brown, T. (2008): Design thinking: Harvard Business Review, 86(6), 84-95.
IDEO (2015): The field guide to human-centered design.
Brown, T. (2019): Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. New York: HarperCollins.
Osterwalder, A., Pigneur, Y., Bernarda, G. und Smith, A. (2014): Value Proposition Design: How to Create Products and Services Customers Want. Hoboken: John Wiley & Sons.
Von Kanitz, A. (2020): Crashkurs Professionell Moderieren. Haufe. 2. Auflage.
Lienhart, A. (2019): Seminare, Trainings und Workshops lebendig gestalten. Haufe.

Notes:

WINB460H Creating Customer Value

Module name: *Creating Customer Value*
Module overview
EDP designation: WINB460H
Module coordinator(s): Prof. Dr Anna Heszler
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester*):* 3rd or 4th curriculum semester
Content requirements: Knowledge of general business administration and marketing, comparable to the courses of the same name
Prerequisites according to SPO: None
Competences: Students can explain the decisive relevance of customer orientation for a company and systematically identify starting points for customer-oriented product development and customer value-enhancing measures for existing products by using, applying and testing the concepts of customer value and the methods for the development and further development of customer-oriented products (e.g. design thinking, Google Design Sprint, co-creation, customer journey mapping) using case studies in order to participate in the customer-oriented development and further development of products in in their professional activities.
Examination: Term paper (in the form of a portfolio, duration 10 weeks) or written examination (90 minutes) or term paper (can also be completed in the form of a project, duration 4 weeks). The exact form of examination will be announced at the beginning of the course.
Usability: The module is also offered in the specialization International Marketing & Sales in the Bachelor's degree programme in Business Management.

Course: Creating Customer Value
EDP designation: BWLB461H
Lecturer: Prof. Dr Anna Heszler (Deputy: Prof. Dr Christian Seiter)
Hours per week (SWS): 4 SWS
Availability: annually in the summer semester
Type and mode: Seminar / compulsory subject in the specialization Management of Sustainable Product Development
Teaching language: German or English
Contents: • Customer centricity as the basis for successful business models • Basics of customer value and customer satisfaction • Involving customers in the innovation process (co-creation) • Methods for customer- and user-orientated product development (e.g. design thinking, Google Design Sprint)

- Phases and touchpoints of the customer journey including examples for different industries

Recommended literature:

Gassmann, O./ Frankenberger K./ Csik, M. (2017): Geschäftsmodelle entwickeln - 55 innovative Konzepte mit dem St. Galler Business Model Navigator.
Gray, D. (2011): Gamestorming – Ein Praxisbuch für Querdenker, Moderatoren und Innovatoren.
Knapp, J./ Zeratsky, J./ Kowitz, B. (2016): Sprint – How to Solve Big Problems and Test New Ideas in Just Five Days.
Kruse Brandão, T./ Wolfram, G. (2018): Digital Connection – Die bessere Customer Journey mit smarten Technologien – Strategie und Praxisbeispiele.
Osterwalder, A./ Pigneur, Y. (2011): Business Model Generation - Ein Handbuch für Visionäre, Spielveränderer und Herausforderer.
Osterwalder, A./ Pigneur, Y./ Bernarda, G./ Smith, A. (2015): Value Proposition Design.
Piller, F./ Möslein, K./ Ihl, C./ Reichwald, R. (2017): Interaktive Wertschöpfung kompakt: Open Innovation, Individualisierung und neue Formen der Arbeitsteilung.

Notes:

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Specialization

Financial Management

WINB350F Corporate Management and Transfer Pricing

Module name: *Corporate Management and Transfer Pricing*

Module overview
EDP designation: WINB350F
Module coordinator(s): Prof. Dr Stefan Bleiweis, Prof. Dr Benjamin R. Kern
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: The course offered builds on the foundation course of the Bachelor's degree programme.
Prerequisites according to SPO: None
Competences: Students will be able to evaluate the structure, instruments and measures of corporate management in an international corporate environment by: a) Naming factors influencing decisions and actions, b) reproducing management models in condensed form, c) linking their functionality to specific problems in order to later be able to evaluate their suitability for solving problems in companies, d) describing the typical intra-group transactions of MNEs, e) classifying the individual business units according to so-called functional and risk profiles, f) analysing typical intragroup transactions on this basis and applying internationally accepted transfer pricing methods. in order to ensure the fundamental "accuracy of fit" between corporate management and the transfer pricing system. After completing the module, students will be able to understand the relationships between the management of multinational companies and the tax transfer pricing regulations, identify potential tensions that may arise and develop initial solutions from an international TP perspective.
Examination: Written exam (90 minutes) or term paper (in the form of a project, 4 weeks). The specific form of examination will be announced at the beginning of the course.
Usability:

Course: Corporate Management
EDP designation: WINB351F
Lecturer: Prof. Dr Stefan Bleiweis
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type/Mode: Lecture / compulsory subject in the specialization Financial Management
Teaching language: German or English

Contents:

- Vision - Goals - Strategies
- Long and short-term corporate planning
- Value-orientated corporate management
- P-D-C-A cycle
- Controlling systems and management models
- Risk management

Recommended literature (latest edition):
Drucker, Peter F.: Management: Tasks, Responsibilities, Practices. New York: Harper Business.
Perlitz, Manfred & Schrank, Randolf: Internationales Management, UTB.
Rieg, Robert: Internationales Controlling, Vahlen Verlag.

Course: Fundamentals of International Transfer Pricing
EDP designation: WINBB352F
Lecturer: Prof. Dr Benjamin R. Kern
Hours per week (SWS): 2 SWS
Availability: annually in the winter semester
Type/Mode: Lecture / compulsory subject in the specialization Financial Management
Teaching language: German or English

Contents:

- Introduction to international transfer pricing
- Basics of international transfer pricing: The F&R profile and common transfer pricing methods
- Analysis of typical intra-group transactions
- Analysis of selected business models and transfer pricing systems

Recommended literature (in the current edition):
Kroppen/Rasch, Handbuch Internationale Verrechnungspreise, Verlag Dr. Otto Schmidt.
OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations.
Renz/Wilmanns, Internationale Verrechnungspreise, Handbuch für Praktiker, Wiley-VCH.
Vögele/Borstell/Bernhard, Verrechnungspreise, C.H.Beck.

WINB360F Financial Controlling and Risk Management

Module name: *Financial Controlling and Risk Management*

Module overview
EDP designation: WINB360F
Module coordinator(s): Prof. Dr Henrik Kunz, Prof. André Wölfle
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of external accounting
Prerequisites according to SPO: None
Competences: Students can: 1. record, describe, systematically analyse and reflect on the specific performance and financial situation of a company or group, 2. analyse and optimise a company's risk management system and develop it from scratch, by: • modelling the performance and financial situation, assessing it on the basis of reference values and deriving options for improvement on the basis of options for action, • understanding the function of the elements of a risk management system, • comparing the various instruments for identifying, assessing and managing risks in terms of their advantages and disadvantages and assessing their effectiveness in different applications (e.g. using case studies), in order to later develop into a competent contact person for a wide range of risk issues within the company and to assess the company's financial situation and organise it appropriately.
Examination: Written exam (90 minutes) or term paper (duration 3 weeks). The specific form of examination will be announced at the beginning of the course.
Usability: The module is part of the specialization in Financial Management in the Bachelor's degree programmes in Business Management and Industrial Engineering.

Course: Financial Controlling
EDP designation: WINB361F
Lecturer: Prof. André Wölfle
Hours per week (SWS): 2 SWS
Availability: annually in the summer semester
Type and mode: Lecture / compulsory subject in the specialization Financial Management

Teaching language: German or English
Contents: Operational and strategic performance and financial controlling, group controlling, investment controlling, investment portfolio management, value-oriented corporate management, company valuation
Recommended literature: Gleich, R.; Linsner, R. (Hrsg.): Finanzcontrolling, Freiburg 2019. Heesen, B.: Cash- und Liquiditätsmanagement, 3. A., Wiesbaden 2016. Mensch, G.: Finanz-Controlling, 2. A., München 2008. Further information in the lecture.
Notes:

Course: Risk Management
EDP designation: WINB362F
Lecturer: Prof. Dr Hendrik Kunz
Hours per week (SWS): 2 SWS
Availability: annually
Type and mode: Lecture / compulsory subject in the specialization Financial Management
Teaching language: German or English
Contents: • Elements of a risk management system • Strategic and operational risk management • Risk identification, risk assessment, risk management • Organisational issues of risk management
Recommended literature: Diederichs, M.: Risikomanagement und Risikocontrolling, 4. Auflage, München 2018. Vanini, U.: Risikomanagement: Grundlagen, Instrumente, Unternehmenspraxis, 2. Auflage, Stuttgart 2021.a
Notes: -

WINB450F Corporate Taxation and International Tax Law

Module name: *Corporate Taxation and International Tax Law*

Module overview
EDP designation: WINB450F
Module coordinator(s): Prof. Dr Katrin Haußmann
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge of external accounting and the basics of taxation, comparable to the courses of the same name
Prerequisites according to SPO: None
Competences: Students have advanced knowledge of national and international corporate taxation in order to be able to comprehensively assess the consequences of business decisions. They are able to determine the taxable profit and the total tax burden of companies of different legal forms and solve more complex case studies on problem areas of income tax, corporation tax and trade tax. Business decisions are increasingly being made in an international context, so that students can also make simple tax planning considerations in the field of international tax law and quantify these.
Examination: Written exam (90 minutes)
Usability: The module is identical to module BWLB350F in the Bachelor's degree programme in Business Management.

Course: Corporate Taxation and International Tax Law
EDP designation: WINBB451F
Lecturer: Prof. Dr Katrin Haußmann
Hours per week (SWS): 4 SWS
Availability: annually in the winter semester
Type and mode: Lecture / compulsory subject in the specialization Financial Management
Teaching language: German or English
Contents: Determination of taxable profit, taxation of companies in the context of ongoing business activities (commercial sole proprietorship, partnership, corporation), comparison of legal forms, concept and causes of double taxation, law of double taxation agreements, taxation of cross-border business activities (direct business, permanent establishment, corporation), structuring alternatives.

Recommended literature (latest edition): Brähler, G.: Internationales Steuerrecht, Springer. Freichel, C. et al.: Ertragsteuern, utb. Jacobs, O.H. et al: Unternehmensbesteuerung und Rechtsform, C.H. Beck. Kudert, S.: Internationales Steuerrecht - leicht gemacht, Ewalt von Kleist Verlag.
Notes:

WINB460F Corporate Treasury

Module name: *Corporate Treasury*
Module overview
EDP designation: WINB460F
Module coordinator(s): Prof. Dr Hendrik Kunz, Prof. Dr Susanne Kruse
Module scope (ECTS): 5 CP (45 hours attendance, 105 hours self-study including exam preparation)
Classification (semester): 3rd or 4th curriculum semester
Content requirements: Knowledge comparable to the Business Mathematics II module, basic knowledge of statistics
Prerequisites according to SPO: None
Competences: Participants will be able to find solutions on the capital market for investment issues and the management and evaluation of financial risks and interpret the resulting outcomes by: • knowing the main investment options (cash instruments, futures instruments) and being able to differentiate and classify them according to key criteria (especially risk, return, liquidity), • being able to use fundamental analysis and chart techniques to apply the main methods for selecting securities, • being able to apply and scrutinise the fundamental models of modern portfolio theory (Markowitz mean-variance portfolio) and securities pricing (capital asset pricing model, arbitrage pricing theory) to both the composition and analysis of a portfolio, • being familiar with the financial risks that occur in an internationally operating company and the need to systematically manage and measure these risks, • extracting relevant information from a market environment as a basis for valuation and risk measurement, • having in-depth knowledge of the evaluation of the relevant control instruments, • calculating and interpreting key risk figures for individual management instruments, in order to be able to evaluate the possible applications of the instruments and procedures available for capital investment or for measuring and managing financial risks in a company in a practical context and to assess and quantify the associated opportunities, risks and limits. Students acquire the knowledge that will enable them to become competent contact persons for investment decisions and the management of financial risks in their future careers.
Examination: Written examination (90 minutes) or term paper (duration 3 weeks). The specific form of examination will be announced at the beginning of the course.
Usability: The Corporate Treasury module is part of the Financial Management specialization in the Bachelor's programmes in Business Management and Industrial Engineering.

Course: Asset Management
EDP designation: WINB461F
Lecturer: Prof. Dr Hendrik Kunz, Prof. Dr Susanne Kruse
Hours per week (SWS): 2 SWS
Availability: annually
Type and mode: Lecture / compulsory subject in the specialization Financial Management
Teaching language: German or English
Contents: • Structure of the financial market • Instruments of the cash market • Sound basis for investment decisions • Portfolio theory
Recommended literature: Beike R., Schlütz J.: Finanznachrichten: lesen – verstehen – nutzen, 6. Auflage, Stuttgart 2015. Bruns C., Meyer-Bullerdiek F.: Professionelles Portfoliomanagement, 6. Auflage, Stuttgart 2020. Murphy J.: Technische Analyse der Finanzmärkte, 9. Auflage, München 2011. Steiner M., Bruns C., Stöckl S.: Wertpapiermanagement, 11. Auflage, Stuttgart 2017.
Notes:

Course: Financial Derivatives
EDP designation: WINB462F
Lecturer: Prof. Dr Susanne Kruse, Prof. Dr Hendrik Kunz
Hours per week (SWS): 2 SWS
Availability: annually
Type and mode: Lecture with integrated case studies / compulsory subject in the specialization Financial Management
Teaching language: German or English
Contents: • Basic principles of financial mathematics and interest calculation • Risk analysis of interest-bearing financial instruments • Fundamentals of the derivatives market and possible uses of financial derivatives • Valuation of selected financial derivatives (forwards, swaps and options)
Recommended literature (latest edition): Albrecht, P.; Maurer, R.: Investment- und Risikomanagement, Schäffer-Poeschel. Hull, J.: Optionen, Futures und andere Derivate, Pearson Studium. Kruse, S.: Aktien-, Zins- und Währungsderivate, Springer Gabler Verlag
Notes: It is recommended to attend the module BWLB311 Statistics before or simultaneously to this module.

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