Module Guide
Building Products and Processes

Faculty European Campus Rottal-Inn
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BPP-01 Engineering Mathematics

Module code	BPP-01
Module coordination	Ibrahim Bader
Course number and name	BPP-01 Engineering Mathematics
Lecturer	Ibrahim Bader
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Students cover basic mathematical terminology as the foundation of all technical modules during the course. This includes mastering methods for preparing and handling mathematical models of processes in both the natural sciences and in technology.

Exercises help consolidate the knowledge acquired, improving the ability to work systematically as well as an algorithmic method of thinking as methodological expertise.

Applicability in this and other Programs

Fundamentals of Building Physics 1, 2, 3 : BPP- 02, BPP-09, BPP-10

Structural Engineering: BPP-04
Construction Calculation: BPP-15
Commercial Management: BPP-21

Entrance Requirements

General entrance qualification for universities of applied sciences (German: *Fachhochschulreife*) in mathematics

Learning Content

Content

- Set theory
- Complex numbers
- Vector calculus and analytic geometry
- Calculating determinants and matrices with applications
- Systems of linear equations
- Sequences and series (of real numbers)
- Functions of a real variable
- (Plane) curves and their mathematical description
- Functions of several variables (introduction)

Teaching Methods

Blackboard, study materials, script, slides, textbooks and the Internet
Lecture with integrated examples, homework

Recommended Literature

- J. Erven, D. Schwägerl, Mathematik für Ingenieure, Oldenbourg Verlag, 4th edition, 3rd edition, 2010
- W. Mückenheim, Mathematik für die ersten Semester, Oldenbourg Verlag, 3rd edition, 2011
- Papula: Mathematik für Ingenieure und Naturwissenschaftler, Band 1 and 2. Springer
- Vieweg 2014
- Papula: Mathematische Formelsammlung für Ingenieure und Naturwissenschaftler.
- Springer Vieweg 2014
- Meyberg; Vachenauer: Höhere Mathematik Band 1 and 2. Springer 2003 and 2005

BPP-02 Fundamentals of Building Physics 1 (Thermal Protection)

Module code	BPP-02
Module coordination	Alexander Siebel
Course number and name	BPP-02 Fundamentals of Building Physics 1 (Thermal Protection)
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basic knowledge about the following:
  - heat and moisture transport
  - heat and moisture storage
  - measurement technology in the fields of heat, humidity and air tightness
- knowledge of thermal insulation and technical thermal insulation requirements
- the evaluation basis for assessing the room climate

Skills:

With the acquired knowledge, students should be able to

- analyse structures in terms of thermal and moisture protection
- plan measures to save energy in existing and new buildings
- analyse measurement results: thermal images, airtightness
- analyse damage to buildings in the area around thermal and moisture protection

Competences:

After successful completion, students will be able to:

- fully understand evidence in the area around thermal protection, check for feasibility and to carry it out effectively
- develop and analyse functional construction designs

Applicability in this and other Programs

Civil Engineering, Architecture

Entrance Requirements

Learning Content

Principles of Construction Physics I
Thermal insulation

- Principles of energy and consumption
- Principles of storing energy
- Principles of heat transport
- Steady-state and transient heat transfer
- Thermal bridges (in new buildings and in renovation work)
- Airtightness of the building envelope
- Principles of building ventilation
- Structural evidence (summer and winter thermal protection)
- Evaluation bases for the room climate

Moisture protection

- Fundamentals of moisture
- Moisture transport in components / sealing technology (new buildings and renovations)
- Evidence of condensation on/in components
- Room air humidity and ventilation

Teaching Methods

Lecture, exercises and examples

Recommended Literature

Standards:
DIN 4108, DIN 18599, ISO 7730, ISO 10211, ISO 10077, ISO 12631

Laws:
Gesetz zur Einsparung von Energie und zur Nutzung erneuerbarer Energien zur Wärme- und Kälteerzeugung in Gebäuden (German Building Energy Act - GEG 2020), Energieeinsparverordung (German Energy Saving Ordinance - EnEV) 2014/2016

References:
Lehrbuch der Bauphysik, Springer Vieweg, Hrsg. Willems
Bauphysikalische Formeln und Tabellen, Werner Verlag, Hrsg. Hohmann, Setzer, Wehling
Course handouts

BPP-03 Construction Chemistry

Module code	BPP-03
Module coordination	Prof. Dr. Roland Augustin
Course number and name	BPP-03 Construction Chemistry
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Students learn about the basics of chemistry to understand the material composition of matter and to derive basic properties and behaviours.

Professional competence:

Knowledge

- Students know the structure of matter at element and molecular level.
- They are able to understand the language of general chemistry (symbols, formula, equations, solution, concentrations).
- They are able to understand the language of cement chemist notation (CCN).
- Students understand the fundamental properties of elements and molecules and are able to establish simple reaction equations.

- They are able to describe simple chemical reactions (Acid-Base Reactions, Redox reactions).
- Based on their knowledge of the state and reaction possibilities of matter, students know the essential properties of exemplary construction materials and external influences on them (e.g. corrosion).

Skills

- Ability to understand chemical problems and translate them into equations and apply the principles of chemistry to solve the problems.
- Ability to analyse the context of material based technical problems and to apply this to the design and development of technical systems and processes.
- Ability to perform basic chemistry-related calculations, including quantities, units and chemical symbols.

Method competences:

After participating in this module, students will be able to understand and analyse material-based and substance-related aspects of some construction materials. They understand possible material-dependent challenges that arise at certain construction processes or over the lifetime of constructs and how to prevent/minimize them.

Social competence:

- Ability to work in intercultural mixed teams and communicate their progress and results.
- Ability to communicate with peers about a complex topic and find a joint approach to solving it.

Applicability in this and other Programs

none

Entrance Requirements

Knowledge of basic mathemeatics, at least at high school-level is recommended.

Learning Content

- Introduction to chemistry
- The periodic table of elements
- Atomic and molecular structure
- Condition of substances, aggregate states, phase transformations, modification
- Chemical bonding
- Chemical reactions

- Principles of physical chemistry
- Principles of organic chemistry
- Composition and properties of important materials (metals, polymers, cement, concrete)
- Cement Chemist Notation
- Corrosion processes

Teaching Methods

Seminaristic teaching, exercises, demonstration experiments.

Recommended Literature

Bendix, "Bauchemie für das Bachelor-Studium", 3rd edition, Springer Vieweg, 2017

BPP-04 Structual Engineering

Module code	BPP-04
Module coordination	Alexander Siebel
Course number and name	BPP-04 Structual Engineering
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Students will acquire

- basic knowledge about the following:
  - the importance, structure and objectives in statics, the concept of security
  - structure of a static calculation
  - load determination
  - compilation and analysis of forces and momentum
  - equilibrium of forces and momentum in the level
- knowledge of the backgrounds behind load assumptions and knowledge with the relevant national German annex for net weight, payloads, wind loads, and snow loads

Skills:

With the acquired knowledge, students should be able to

- recognise the most important elements and support structures in statics
- handle support structures
- confidently apply the cutting principle and equilibrium conditions
- determine supporting loads and cutting force lines on statically determined systems
- know the principles for determining loads

Competences:

After successful completion, students will be able to:

- prepare statics-related tasks
- recognise and apply mechanical contexts
- ask technical questions
- answer technical questions appropriately
- realistically appraise their own knowledge regarding the specialist area

Applicability in this and other Programs

Civil Engineering, Architecture

Entrance Requirements

Learning Content

Principles of statics

- Fundamentals of effects (area loads, line loads, individual loads, idealisation, load flow)
- Development of load models as a result of the effects
- Explanations and notes regarding the effects on support structures according to: DIN EN 1991-1-1-1: Densities, self-weight, imposed loads for buildings, DIN EN 1991-1-3: Snow loads, DIN EN 1991-1-4: Wind loads
- Design situations and action combinations according to DIN EN 1990: Principles of structure planning, safety concept and design rules
- Exercise based on practical examples
- Insight into determining effects via computer programs

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

References:
Leicher, Kasper, Kasper: Tragwerkslehre in Beispielen und Zeichnungen, Reguvis, 5th edition, 2022
Widjaja, Baustatik ? einfach und anschaulich, Bauwerk BBB Beuth, 5th edition 2020
Gross,Hauger, Schröder, Wall: Technische Mechanik, Band 1: Statik, 12th edition 2013, Springer Verlag, Berlin
Course handouts

BPP-05 Building Informatics

Module code	BPP-05
Module coordination	Alexander Siebel
Course number and name	BPP-05 Building Informatics
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basic knowledge about the following:
  - computer science for engineers (applied computer science)
  - implementation of engineering tasks in a table calculation
  - noting standards and guidelines in programme sequence controls
  - programming and controlling microcontrollers
- use of microcontrollers in measurement technology and automation

Skills:

With the acquired knowledge, students should be able to

- establish the fundamentals in a table calculation

- carry out calculations and analyses
- report using diagrams and tables
- program microcontrollers

Competences:

After successful completion, students will be able to:

- carry out data analyses and process series of measurements
- prepare dynamic reports
- understand standardised programming / programme sequence controls
- understand controlling via actuators and sensors
- measurement data acquisition via sensors

Applicability in this and other Programs

Civil Engineering, Architecture

Entrance Requirements

Learning Content

Basics of building informatics

- Basics in a table calculation
- Import and adjust data series (e.g. measurement data)
- Reporting with diagrams and tables
- Standardised programming (programme sequence control)
- Automation with macros / VBA
- Programming microcontrollers (e.g. Arduino, SPS)
- Controlling and switching via actuators, sensors, humidity protection

Teaching Methods

Lecture, exercises and examples, practice project

Remarks

Recommended Literature

References:

Stephan Nelles: Excel im Controlling, Rheinwerk Computing; 4. Edition (28 April 2019)
Harald Nahrstedt: Excel + VBA für Ingenieure: Programmieren erlernen und technische Fragestellungen lösen, Springer Vieweg; 6th current and revised 2021 edition (11 February 2021)
Danny Schreiter: Arduino: Kompendium: Elektronik, Programmierung und Projekte; BMU Verlag (5 July 2019)

Course handouts

BPP-06 Workshop Architecture

Module code	BPP-06
Module coordination	Prof. Dr. Michael Laar
Course number and name	BPP-06 Workshop Architecture
Lecturer	Prof. Dr. Michael Laar
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	3
ECTS	3
Workload	Time of attendance: 45 hours self-study: 45 hours Total: 90 hours
Type of Examination	report/presentation
Weighting of the grade	3/210
Language of Instruction	English

Module Objective

Module Objective

Students learn about challenges and complexities of architecture on international, national and regional level. They learn the historical development of architecture, its current state and possible future scenarios. Furthermore, they understand the role of architects in the construction sector.

Based on case studies, the students understand the concepts of architecture and the role of architects from start to end.

Professional Competence

Knowledge

After successfully finishing the module, students will get to:

- Understand architecture in its international, national, and regional context
- Understand the role of architects and the design process
- Understand vernacular architecture and its concepts in the context of different climate zones and possible transfers to modern architecture
- Understand the context of building and neighbourhood

Skills

Upon completion of the module the students will be able to:

- Describe basic concepts of architecture and its relevance on international, national and regional level and use technical terms adequately
- Describe the role of architects and the design process
- Describe concepts of vernacular architecture in different climate zones
- Transfer adequate concepts of vernacular architecture to contemporary architecture

Social competence

Students are demonstrating working individually or in small groups to solve problems that aim at enhancing their team-working skills as well as their problem-solving capabilities. Further, students also know how to work with different groups of stakeholders, understand their perspectives, learn to consider these perspectives in their line of argumentation and act accordingly.

Methodological competence:

The students improve the knowledge in the field of architecture based on real case studies. The students should be enabled to apply the acquired knowledge and to critically evaluate and inter-present subject-specific information on the basis of criteria of architecture. Students develop an analytical system-oriented way of thinking and are able to structure the approach for building projects.

Applicability in this and other Programs

none

Entrance Requirements

Learning Content

- Basics of architecture: historical development, current situation and future projection
- Analysis of vernacular architecture in different climate zones
- Different stakeholder - different perspectives: how to deal with it
- Building and neighborhood

Teaching Methods

Seminaristic teaching / Exercises / Case studies / Moderated discussions / Lab-work & LivingLab /Field trips / Guest lectures

Remarks

Remarks

Excursions to landmark projects

Recommended Literature

- Zukowsky, J.,Kern S. (2022) Die Geschichte der Architektur: Von der Pyramide zum Wolkenkratzer. München:Prestel Verlag
- Weber, W., Yannas, S. (2014) Lessons from Vernacular Architecture: Achieving Climatic Buildings by Studying the Past. New York:Routledge
- Neufert, E. (2019) Architects? Data. 5th Edition. Hoboken, NJ, USA:Wiley Blackwell
- Neufert. E. (2021) Bauentwurfslehre. 43. Auflage. Wiesbaden:Springer Vieweg

BPP-07 Technical English / Technical German

Module code	BPP-07
Module coordination	Tanja Mertadana
Course number and name	Technical German Technical English BPP-07 Technical English / Technical German
Lecturer	Dozierende für AWP und Sprachen
Semester	1
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Bachelor
Semester periods per week (SWS)	6
ECTS	2
Workload	Time of attendance: 30 hours self-study: 30 hours Total: 60 hours
Type of Examination	See examination schedule AWP and languages, written ex. 60 min.
Duration of Examination	60 min.
Weighting of the grade	2/210
Language of Instruction	English, German

Module Objective

The module Technical English/Technical German (B2/C1) aims to equip students with specialised language skills necessary for independent performance in a globalised field of building products and processes. In doing so, it strives to deepen the students' relationship with the English and/or German language in technical fields so that they can effectively and efficiently implement the respective language as a practical means of communication.

The module covers the four basic language skills - listening, reading, speaking and writing. Students expand their subject-specific vocabulary and deepen their knowledge of the language structures.

The main focus of the module is to optimise fluency and improve the ability to communicate in English/German in order to better understand texts and conversations. Through task-based speaking, listening, reading and writing activities, students enhance their communicative skills and develop their ability to express themselves. This enables them to participate in technical discussions, to work in a team, to create relevant documents independently, and to successfully present in English/German.
On completion of the module, the students will have achieved the following learning objectives:

Professional skills

- The students will be proficient in English/German at a confident language level (B2/C1, CEFR) and will also be able to understand technical discussions in the field of building products and processes
- They will have the skills to understand specialised literature and to write texts independently at a B2/C1 level
- Students will have acquired the skills to express themselves at B2/C1 level in formal and professional contexts
- They will be able to understand discussions and more complex content in their field of specialisation
- They will develop the ability to functionally apply grammatical structures in their future professional fields
- They will be able to give comprehensible and detailed presentations on relevant topics related to building products and processes They are able to present their own opinions and also different points of view in a comprehensible way

Methodological skills

- Students will have expanded their language acquisition skills by reflecting on their individual styles of learning
- They will be able to filter information from different English/German sources and use it for their presentations

Social skills

- Students will have developed their social skills of teamwork, reliability, and negotiation skills
- They will have the communication skills necessary to collaborate with others to find solutions
- They will reflect on their learning experiences from independent projects and teamwork

Personal skills

- Students will have developed sound language skills and social skills, which are of fundamental importance for personal development and the future work environment

Applicability in this and other Programs

No applicability in other degree programmes.

Entrance Requirements

Successful completion of the following modules is recommended

The prerequisite for successful participation in the module is a command of the chosen language (English/German) at B2 level, based on the Common European Framework of Reference for Languages (CEFR).

Learning Content

Technical English

1. Introduction to building products and processes
2. Communication with engineers
3. Project plans and project management
4. Processing data
5. Measurements and units
6. Geometry and design
7. Describing forces
8. Materials and their properties
9. Eco-efficiency
10. Safety and risk
11. Functionality and optics
12. Overview of grammar and language skills
13. Writing skills in English

Technical German

1. Building materials

1.1 Technical vocabulary for describing and naming building materials
1.2 Word order when linking sentences
1.3 Description of building materials in terms of their chemical composition

2. Building products

2.1 Technical vocabulary for describing and naming different building products
2.2 Use of suffixes with adjectives
2.3 Describing building products in terms of their function and structure

3. Building components/ Trades

3.1 Technical vocabulary for describing and naming various building components and trades in building construction and finishing
3.2 Use of word combinations relating to the different trades (e.g. HVAC, energy, finishing, building shell, roof)

4. Building processes
4.1 Technical vocabulary for describing and naming processes in product development and project execution
4.2 Repetition of the procedural passive voice for describing construction processes
4.3 Use of word and sentence combinations for product management and marketing

5. Communication with customers
5.1 Addressing people in everyday business life
5.2 Gender-sensitive language forms
5.3 Writing e-mails
5.4 Use of the du/Sie form in German
5.5 Writing business letters

Teaching Methods

Teaching and learning methods focus on improving the four main language skills (listening, speaking, reading and writing) and on enhancing professional and social skills. Examples of teaching methods used include various forms of group and individual work, mini-presentations, intensive reading and listening exercises, role-play and grammar games, loci method, dictation exercises, translations, peer feedback, work with learning stations, and various writing activities to strengthen the knowledge gained.
Students will be given weekly assignments for self study.

Remarks

All language courses require a compulsory attendance rate of 75% in order to be allowed to take the examination.

Recommended Literature

Technical English

Baade, K., Holloway, C. et al *Business Result: 2nd ed.: Advanced* Oxford: OUP, 2018.

Bonamy, D. *Technical English 4: Course Book* . Edinburgh: Pearson, 2011

Brook-Hart, G. *Business Benchmark. 2nd ed.: Upper Intermediate* . Cambridge: CUP, 2013.

Emmerson, P. *Business English Handbook Advanced* . London: Macmillian, 2007.

Gordon, J. *Structures: Or Why Things Don't Fall Down* . New York: Hatchette, 2003

Heidenreich, S., *English for Architects and Civil Engineers* , Vieweg: Teubner, 6th Edition, 2019.

Jacques, C. *Technical English 4: Workbook* . Edinburgh: Pearson, 2011

Lansford, L., Astley, P. *Oxford English for Careers: Engineering* , Oxford: OUP, 2013

Murphy, R. *English Grammar in Use: Klett Fifth Edition.* Cambridge: Klett Publishing, 2019.

Technical German

Friedrich, F./Heidenreich, S.: Deutsch für Architekten und Bauingenieure: Ein Sprachlehrbuch zur Planung und Durchführung von Bauprojekten mit Vokabeln, Redewendungen und Übungen, Wiesbaden: Springer, 2021.

Jin, F.: Grammatik aktiv - Deutsch als Fremdsprache B2/C1, Berlin: Cornelsen, 2017.

Kärcher-Ober, R.: Deutsch für Ingenieure, Munich: Hueber, 2016.

Perlmann-Balme, M./ Schwalb, S./ Dr. Matussek, M.: Sicher in Alltag und Beruf! C1.1 Deutsch als Zweitsprache/ Kurs- und Arbeitsbuch, Munich: Hueber, 2020.

Schlüter, S.: Im Beruf NEU B2+/C1 Deutsch als Fremd- und Zweitsprache/ Kursbuch, Munich: Hueber, 2019.

Schlüter, S.: Im Beruf NEU B2+/C1 Deutsch als Fremd- und Zweitsprache/ Arbeitsbuch, Munich: Hueber, 2019.

BPP-08 Electrical- and Power Engineering

Module code	BPP-08
Module coordination	Wolfgang Schauer
Course number and name	BPP-08 Electrical- and Power Engineering
Lecturer	Wolfgang Schauer
Semester	2
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Professional Competence

Knowledge

Students are able to explain and reproduce basic theories, principles, and methods related to:

- Fundamental relations between electrical quantities
- Basic components: sources, resistance, capacitor and inductor
- Electrical circuits and fundamental effects that may occur within electrical circuits and networks
- Network theorems and network analysis methods

- Transient analysis of electrical circuits and application of the Laplace transform for transient analysis
- Steady dc and ac analysis, complex representations and phasor diagrams
- Fundamental elements and parameters of electrical power supply

Skills

Students are capable of:

- Applying theoretical concepts to practical applications
- Applying general methods for the analysis of electrical networks
- Calculating parameters of simple electrical networks
- Calculate networks with sinusoidal excitations applying the complex calculation methods
- Using the Laplace transform to compute transients with initial conditions and work with correspondence tables
- Applying simulation tool SPICE for the simulation of simple stationary and unsteady problems
- Dimensioning circuit elements by means of a design
- Analysing and building simple circuits on experimental boards
- Implementing simple measurements, working with instruments: multimeters, signal generators and oscilloscope

Personal Competence

Social competence

Students can analyse and solve problems in small groups, can compare theoretical results with experiments and discuss it within the group. Present the related topics to professionals and discuss and argue for the obtained results.

Autonomy

The students are able to acquire skills outside their lectures form literature as well as and can solve problems by their own. They are able to relate their acquired knowledge to other lectures.

Applicability in this and other Programs

The module provides basic competences for other courses of different study programs that require electrical engineering fundamentals

Entrance Requirements

Knowledge of elementary mathematics and physics is recommended.

Learning Content

The module provides introduction to the fundamentals of electrical engineering addressing:

- Physical electrical quantities, dc and ac signals
- Circuit components: sources, resistors, capacitors and inductors
- Circuits: series, parallel, star and delta connections
- Ohm's law, electrical dc power and energy
- Kirchhoff?s laws
- Network theorems: Thévenin, Norton, Superposition
- Network analysis: mesh current and nodal voltage methods
- Transient analysis using Laplace transform
- AC circuits and components with sinusoidal excitation
- Apparent, reactive and active ac power, power factor
- Phasors and phasor diagrams
- Complex representations and calculation of ac circuits
- Transfer functions, logarithmic scales, Decibels and Bode-plot
- Simple filters

Practical laboratory experimental sessions are enabling the students to consolidate the theoretical knowledge as well as to develop practical skills in addressing and handling electrical circuits and equipment.

Teaching Methods

Seminaristic teaching / exercises / home work

Whiteboard, PowerPoint presentation, document camera (visualiser) and additional lecture materials in iLearn

Experiments in small groups using training material that relays on professional computer-based experimentation system where multimedia combines cognitive and hands-on training units into a comprehensive unified concept enabling students to consolidate theoretical building blocks and practical skills for a maximum learning effectiveness.

Recommended Literature

Weißgerber: Elektrotechnik für Ingenieure I, 11. Auflage. Springer/Vieweg, Wiesbaden 2018.

Weißgerber: Elektrotechnik für Ingenieure II, 10. Auflage. Springer/Vieweg, Wiesbaden 2018.

Weißgerber: Elektrotechnik für Ingenieure Klausurrechnen, 7. Auflage. Springer/Vieweg, Wiesbaden 2018.

M. und N. Marinescu: Elektrotechnik für Studium und Praxis: Gleich-, Wechsel- und Drehstrom, Schalt- und nichtsinusförmige Vorgänge. Springer/Vieweg 2016.

Thomas Harriehausen, Dieter Schwarzenau, Moeller Grundlagen der Elektrotechnik, 24. Auflage, Springer Vieweg 2020

Lucas-Nülle, Computer-based training material and experimentation systems on Electrical Engineering, UniTrain Course and Systems, https://www.lucas-nuelle.com/

BPP-09 Fundamentals of Building Physics 2 (Fire Protection)

Module code	BPP-09
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-09 Fundamentals of Building Physics 2 (Fire Protection)
Semester	2
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

- Uniform temperature curve in accordance with DIN 4102, ISO 843, EN 1363-1
- Building classes 1-5 and special structures
- Material classes and test procedures in accordance with DIN 4102 and EN 13501
- Fire resistance classes and test procedures in accordance with DIN 4102 and EN 13501

- Evidence of suitability of components and materials in accordance with domestic and European rules
- DIN 4102-4, sample tubing system guidelines, sample ventilating system guidelines, Eurocode, BayBo, MBO
- System knowledge of fire-resistant designs for the building structure, interior construction, building envelope and fire safety bulkheads for in-house facilities

Skills:

After successful completion, students will be able to recognise and safely apply structural and planning tasks for various uses of building (such as residential, office buildings, meeting rooms, hospitals, hotels, commercial use) as well as measures relevant from a fire safety perspective. In this case, students will be able to communicate, using the correct parlance (in German and English) with building contractors, general planners, specialist planners or building authorities.

Competences:

- Will be able to recognise which measures are necessary for fire safety in a building so that legal stipulations are followed.
- Will be aware of the calculation process for bearing and non-bearing components, and can apply these confidently
- Will be able to set out components such as materials as part of building planning regarding fire behaviour, to monitor this when construction work is carried out, and to confidently apply the corresponding evidence of suitability.

Applicability in this and other Programs

Civil Engineering, Architecture

Entrance Requirements

Learning Content

- Legal principles of fire safety: current MBO, LBO, technical building regulations, administrative provision of building regulations, DIN 4102-4, special building regulations (high-rise buildings, accommodation, places of assembly, etc.) fire safety guidelines introduced by building authorities, EUROCODE
- Structural fire safety of the escape route (necessary corridor / staircase)

- Components with fire resistance along with bearing and non-bearing construction elements for the structure of the building & interior construction & façade along with their evidence of suitability.
- Fire behaviour of materials and components, along with their national and European test processes or classification systems.
- Measurement of fire safety retrofitting measures for load-bearing steel and timber supports and carriers.

Fire safety partitions for technical building equipment such as electrical, pipeline and ventilation systems.

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

Vfdb-Leitfaden Ingenieurmethoden des Brandschutzes
BayBo, MBO, DIN 4102-4, Brandschutzatlas, current script of the lecture

BPP-10 Fundamentals of Building Physics 3 (Building and Room Acoustics)

Module code	BPP-10
Module coordination	Alexander Siebel
Course number and name	BPP-10 Fundamentals of Building Physics 3 (Building and Room Acoustics)
Semester	2
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basic knowledge about the following:
  - sound waves, vibrations, variables
  - calculations with sound levels, calculation of sound propagation
  - sound insulation of components
  - calculation of reverberation times
- room and architectural acoustics requirements, minimum requirements and more stringent requirements
- an overview of measurement technology in architectural acoustics

Skills:

With the acquired knowledge, students should be able to

- analyse construction designs regarding sound insulation
- evaluate and appraise material properties
- analyse requirements for residential and non-residential buildings, particularly with mixed use

Competences:

After successful completion, students will be able to:

- plan and evaluate room and architectural acoustics requirements for existing and new building stock
- recognise execution errors in the construction phase
- develop concepts for room acoustics

Applicability in this and other Programs

Der erfolgreiche Abschluss der folgenden Module wird empfohlen:

Civil Engineering, Architecture

Entrance Requirements

Successful completion of the following modules is recommended.

Construction Chemistry BPP-03

Engineering Mathematics BPP-01

Learning Content

Basics of Building Physics III
General

- sound insulation, general principles of acoustics

Immission control

- Principles of immission control, technical rules and requirements
- Immission control, rating level, outdoor sound propagation

Architectural acoustics

- Requirements of architectural acoustics
- Principles of sound and footfall insulation
- Design and measurement of single and multiple-shell components
- Planning and measurement of in-house facilities
- Measurement of solid and skeletal construction
- Metrological evidence

Room acoustics:

- Principles of room acoustics
- Acoustic planning of a room: Reverberation time, room geometry
- Requirements of room acoustics

Metrological test

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

Standards:
DIN 4109, DIN 18005, DIN 18041, VDI 2569, ASR A3.7

Laws / by-laws:
Technische Anleitung zum Schutz gegen Lärm (TA-Lärm) (Technical Instructions on Noise)
Bundes-Immissionsschutzgesetz (BImSchG) (Federal Immission Control Act)

References:
Lehrbuch der Bauphysik, Springer Vieweg, Hrsg. Willems
Fasold / Veres, Schallschutz und Raumakustik in der Praxis
Bauphysikalische Formeln und Tabellen, Werner Verlag, Hrsg. Hohmann, Setzer, Wehling
Course handouts

BPP-11 Building Material Characteristics

Module code	BPP-11
Module coordination	Prof. Dr. Roland Augustin
Course number and name	BPP-11 Building Material Characteristics
Semester	2
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Introduction, general:
Building material characteristics focus on the materials used for constructing buildings. The physical, chemical and mechanical properties of materials are introduced: Strength, specific masses, malleability, ageing behaviour, thermal conductivity and storage capacity, fire resistance, water permeability

Orientation:
Can evaluate the materials in terms of structural and mechanical properties, and use it expediently both in shell construction as well as in interior construction. The focus equally lies in application of materials / material combinations in both new buildings as well as renovation projects.

Skills:

With the acquired knowledge, students should be able to

- recognise the physical, chemical and mechanical properties of the most important materials
- have an understanding of the manufacturing and acquisition of building materials
- determine physical and technical properties

Competences:

After successful completion, students will be able to:

- select a material based on the requirements profile (mechanical and physical features, aspects of sustainability and durability)
- evaluate materials that are in stock (ageing behaviour / upgrading)
- select materials while also taking cost-effectiveness and sustainability into account (resource-friendly material composition)

Applicability in this and other Programs

Building Informatics BPP-05

Civil Engineering, Architecture

Entrance Requirements

Learning Content

Principles of building materials

- General basic terms and classification
- Wood and wood materials
- Metals and non-ferrous metals
- Mineral building materials (natural stone, glass, masonry, and mortar)
- Concrete / reinforced concrete
- Bitumen and asphalt
- Heating insulating materials
- Plastics
- Recycling materials

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

References:
Neroth, G. / Vollenschaar, D. (2011): Wendehorst Baustoffkunde: Grundlagen - Baustoffe - Oberflächenschutz. Vieweg + Teubner, Wiesbaden.
Course handouts

BPP-12 CAD 2D / 3D (BIM)

Module code	BPP-12
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-12 CAD 2D / 3D (BIM)
Semester	2
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	6
Workload	Time of attendance: 60 hours self-study: 120 hours Total: 180 hours
Type of Examination	Portfolio
Weighting of the grade	6/210
Language of Instruction	German

Module Objective

Knowledge:

Students will know at least 2 CAD software applications, such as Autocad, Revit and can use these confidently. Knows the usual data exchange formats in the CAD sector for both graphic geometrical data as well as for metadata.

Skills:

Will be able to apply the relevant guidelines or standards for preparing construction plans whilst being able to use CAD technologies to create practical and appropriate drawings.

Competences:

After successfully completing the sub-module, students will be able to prepare simple building plans in both 2D and 3D with the aid of a computer. In this case, the relevant floor levels as well as the building views are shown to scale and necessary detailed constructions of the components are carried out.

Applicability in this and other Programs

Civil Engineering, Architecture

Entrance Requirements

Learning Content

Principles of 2D/3D-CAD - Planning:

- Preparation of building drawings (labelling, line types, dimensioning) in line with standards
- Area, wire, volume models
- Creation of layouts, perspectives, dimensioning, round view, hatches, layer structures
- Preparation of components such as masonry, reinforced concrete, timber walls, windows, doors, roof, staircases, etc.
- Implementation planning (detailed construction designs)
- Simple bills of equipment

Principles of parametric planning

Model-based stocktaking

- From the point cloud (scan data) to geometry (vector data)
- 3D building modelling and plan generation
- Model-based collaboration & communication (BCF workflow)

Teaching Methods

Lecture, exercises and examples, practice project

Remarks

Recommended Literature

Manuals from CAD software manufacturers such as Autodesk
Scripts and documents from the lecture

BPP-13 Intercultural Competences and Management Skills

Module code	BPP-13
Module coordination	Prof. Dr. Michelle Cummings-Koether
Course number and name	BPP-13 Intercultural Competences and Management Skills
Lecturer	Prof. Dr. Michelle Cummings-Koether
Semester	2
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	4
Workload	Time of attendance: 60 hours self-study: 60 hours Total: 120 hours
Type of Examination	report/presentation
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Acting across cultures and the necessary capabilities to do so is an important part of social skills that are required to act in a global world. These skills are also an important component for managers who focus on international matters within their companies, whether it's the management of international teams, customer support, or other processes within the company.

Cross-cultural differences can have an impact on effective collaboration, and these differences are often not recognised until misunderstandings have taken place. Recognising or countering such situations before they arise, and then resolving them, is a key part of cross-cultural skills and effective management. This ability to recognise

cultural differences and to react appropriately to them can lead to more successful working relationships. Cross-cultural awareness is the ability to see your own cultural pattern and to understand the cultural patterns of other people, as well as to find ways of reducing misunderstandings and conflicts for future cultural interactions.

Upon completing the course, students should have the following capabilities and skills:

Theoretical competences and skills:

- Knowledge and understanding of the most important theories, concepts, and models in intercultural communication and management.
- The ability to collaborate with other cultures to achieve a shared level of understanding, based on analysis of similarities and differences.
- Being effective in international environments, particularly the international realm of the construction industry.
- Understand, resolve, and recognise cultural issues and how these can have an impact on a working and management level.
- Recognise how stereotypes and prejudices can arise in interactions between cultures.
- The ability to distinguish between the different types of culture and leadership styles.

Methodological skills:

Students will be able to understand how cultures develop and change over time. They can consider and recognise specific types of behaviour and recognise which cultural standards drive such behaviour, and can adapt their own conduct so that they can react appropriately. They are able to analyse the effectiveness of collaboration with others on different levels, which go beyond mere capabilities, and to look for cultural patterns that fit well with their own.

- Students will have developed oral and written presentation skills. They demonstrate teamwork, the ability to ask questions and to listen.
- They show understanding of how cultural factors can have an impact on certain situations within the international realm of the construction industry.

The module explores intercultural skills, cultural identity and cultural diversity from a strategic, organisational and und business perspective, as well as how these are visible in various sectors.

Personal and social skills:

- The ability to understand your own cultural patterns and attitudes.
- The ability to improve your own tolerance of cultural differences.
- Increased cultural and emotional intelligence.

Applicability in this and other Programs

none

Entrance Requirements

Learning Content

Students will be able to work more effectively in international environments, and also to communicate more effectively with colleagues from cultures that are different to their own. This is a skill that is useful for all aspects of the construction industry.

Application of intercultural theory to management attitudes. The students are better equipped to successfully resolve cross-cultural issues and conflicts as well as potential misunderstandings. The students can recognise and apply the most common management methods for intercultural and international situations. This can be applied on various management courses.

Teaching Methods

- Group discussion
- Interactive discussion
- Interactive exercises
- Presentations
- Case studies
- Independent research and analysis

Recommended Literature

Recommended reading (if possible in the most current edition):

- Deresky, H. (2017). International Management: Managing across Borders and Cultures . New Jersey: Pearson.
- Hofstede, G. (2010). Cultures and Organizations: Software of the Mind . New York: Mcgraw-Hill.
- Kawamura, K.M. (2015). Cross Cultural Competence. A Field Guide for Developing Global Leaders and Managers . Bingley: Emerald Group Publishing.
- Lewis, R.D. (2005). When Cultures Collide: Leading Across Cultures . Boston, MA: Nicholas Brealey International.
- Meyer, E. (2016). The Culture Map . New York: Public Affairs.
- Moran, R.T.; Harris, P.R.; Moran, S.V. (2010). Managing Cultural Differences: Global Leadership Strategies for Cross-Cultural Business Success. London: Routledge.

- Smith, P.B. (2006). When Elephants Fight, the Grass Gets Trampled: The GLOBE and Hofstede Projects: Commentary. Journal of International Business Studies , 37(6), pp. 915-921.
- Sowell, T. (2019). Discrimination and Disparities . New York: Basic Books.
- Trompenaars, F. & Hampden-Turner, C. (2011). Riding the Waves of Culture: Understanding Diversity in Global Business . Boston, MA: Nicholas Brealey International.

BPP-14 Law 1 (Construction Law / Construction Contract / VOB)

Module code	BPP-14
Module coordination	Tobias Appel
Course number and name	BPP-14 Law 1 (Construction Law / Construction Contract / VOB)
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- Rights and obligations of the contracting parties relating to the award of construction contracts according to VOB - Part A (VOB/A): General conditions of contract relating to the award of construction work - Part B (VOB/B): General conditions of contract for the execution of construction contracts - Part C (VOB/C): General technical specifications (ATV DIN) in construction contracts (ATV DIN)

- German Civil Code (BGB) in relation to contracts for work and services
- Legal framework for construction contracts abroad according to FIDIC (Fédération Internationale des Ingénieurs Conseils) and its model contracts (Red Book, Yellow Book, Silver Book, White Book)
- Model letters for the business processes in construction management

Skills:

Upon successful completion of the sub-module, students will be able to:

- Correctly assess the tasks and responsibilities in construction management
- Reflect different perspectives and interests of the contractual partners involved in national and international construction projects
- Distinguish between contractually owed, changed and additional services (VOB/B)
- Distinguish between additional services and special services (VOB/C)
- Apply the correct consequences under building law depending on the existing situations
- Identify, notify, document and enforce supplementary claims with legal basis in simple cases
- Verify additional requirements from partner companies in terms of entitlement and plausibility

Competences:

Upon successful completion of the sub-module, students will have competences in the following:

- Importance and application of VOB Parts A,B and C as a basis for the correct description of the building work and the building execution in national construction projects
- Significance, application and differences between VOB/B and German Civil Code in relation to contracts for work and services
- Significance and application of the FIDIC contract types in international construction projects, depending on which services the contractor takes on and which tasks remain with the principal
- Significance and use of model letters for correspondence ranging from acceptance requests, notices of objections, extensions of deadlines, obstruction notices to final payment declarations and repayment of the security deposit

Applicability in this and other Programs

BPP-15 Construction Calculation

BPP-16 Project Management 1

BPP-17 Project Management 2

BPP-21 Commercial Management

BPP-31 Building in existing structures

All similar courses in civil engineering

Entrance Requirements

Learning Content

- Building contracts and building contract law
- Acceptance of work performance
- Construction period - execution and contract deadlines
- Disruption of the construction process and premature termination of the contract
- Model letters
- Building defects
- Invoicing and payment as well as subsequent claims
- Securities
- Modifications and commissioning modifications

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- VOB/A, VOB/B and VOB/C
- BGB (German Civil Code)
- FIDIC

BPP-15 Construction Calculation (Offer and Project Cost Control)

Module code	BPP-15
Module coordination	Prof. Dr. Matthias Hümmer
Course number and name	BPP-15 Construction Calculation (Offer and Project Cost Control)
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- The basics of the different costing methods (calculation of overheads, final totals, contribution margins and fixed prices)
- The basics of the different stages of construction costing (tender, job and labour costing)

Skills:

Upon successful completion of the sub-module, students will be able to:

- Approach a tender calculation in a structured way, to calculate the individual costs of the partial services, to systematically record and calculate the overhead costs of the construction site and to determine the unit prices with the help of the tender documents.
- Decide between different construction methods with the help of cost comparisons, both for tender costing and for labour costing.
- Deduce costing consequences from the building contract and during construction and evaluate them financially.

Competences:

Upon successful completion of the sub-module, students will have competence in the following:

- Application of the correct costing procedures depending on the time at which the costing is carried out (tender phase, before or during the execution of the building contract)
- Efficient preparation of a tender costing, which is the basis for successful negotiation and contract award
- Design and evaluation of tender text for recyclable building products for sustainable buildings
- Keeping active labour costings according to the project progress for effective construction site and project monitoring

Applicability in this and other Programs

BPP-16 Project Management 1

BPP-17 Project Management 2
BPP-21 Commercial Management

BPP-26 Seminar on Project Management
BPP-31 Building in existing structures

All similar courses in civil engineering

Entrance Requirements

No prerequesites besides school level math.

Learning Content

Content

- Types of tenders
- Performance specification
- Types of costings
- Quantity take-off and cost determination (model-based)

- Pricing of partial services
- Dealing with preliminary comments
- Submission/ Negotiation
- Adapting cost structure to changes construction site situation
- Target times for building costs monitoring
- Guideline values for the award of partial services
- Monitoring of construction site and project

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- Egon Leimböck, Ulf Rüdiger Klaus, Oliver Hölkermann, Baukalkulation und Projektcontrolling, SpringerVieweg-Verlag
- Drees, Krauß, Berhold, Kalkulation von Baupreisen ? Hochbau, Tiefbau Schlüsselfertiges Bauen, Beuth Verlag

BPP-16 Project Management 1 (Planning Control)

Module code	BPP-16
Module coordination	Prof. Dr. Matthias Hümmer
Course number and name	BPP-16 Project Management 1 (Planning Control)
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- Procedures, instruments and documents in project preparation
- Contractual, ancillary and special services according to VOB
- HOAI - Planning phases
- Differentiation of partner companies between supplier, subcontractor, installation partner and service provider
- Assessment, selection, commissioning and evaluation of partner companies and the necessary certificates and approvals
- Costing types - from tender costing, original costing, job costing, labour costing;

Skills:

Upon successful completion of the sub-module, students will be able to:

- Determine the required materials by means of quantity take-offs from execution plans or 3D models
- Distinguish between the required products with regard to principal, supplementary or special performance in order to generate possible supplementary potential.
- Identify ecologically better and economically more favourable alternatives
- Prepare and evaluate price enquiries and price comparison lists
- Request and/or order materials and installation services correctly
- Know and evaluate required verifications for products/services/companies regarding quality, environmental aspects and approvals
- Prepare the work costing on the basis of the tender calculation/job costing with the results of the project preparation

Technical competences:

Upon successful completion of the sub-module, students will have competences in the following:

- Projects of simple to medium complexity in the areas of action: To prepare quality, quantity, costs, deadlines, capacities, logistics, contracts, evidence and documentation
- To assess, select, commission and evaluate suppliers, subcontractors, installation partners and service providers for building products and projects with regard to price, quality, sustainability and approvals
- To plan projects correctly so as to limit risks, exploit opportunities and achieve specifications regarding product and execution in terms of quality, on time and within budget

Applicability in this and other Programs

BPP-17 Project Management 2
BPP-21 Commercial Management
BPP-26 Seminar on Project Management
BPP-31 Building in existing structures
All similar courses in civil engineering

Entrance Requirements

Learning Content

- Project preparation
- Quantity take-off
- Scheduling
- Procurement
- Work costing
- Supplementary work
- Project file
- Verifications, approvals

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- Bernd Kochendörfer, Jens H. Liebchen, Markus G. Viering, Bau-Projekt-Management, Grundlagen und Vorgehensweisen

BPP-17 Project Management 2 (Organization, Lean)

Module code	BPP-17
Module coordination	Prof. Dr. Matthias Hümmer
Course number and name	BPP-17 Project Management 2 (Organization, Lean)
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- Building organisation and building processes
- Occupational safety and environmental protection regulations on the construction site
- Legal requirements for the use of installation partners and subcontractors
- Lean construction management ? detailed scheduling / timing
- Digitalisation of building processes and building operations
- Inspection of products and building trades during construction
- New business models for circular construction

Skills:

Upon successful completion of the sub-module, students will be able to:

- Develop necessary site-specific, technical solutions
- Use installation partners and subcontractors in accordance with the legal requirements
- Create concepts for recyclable materials
- Realise a synchronised work organisation throughout the entire construction process - to plan detailed deadlines
- Carry out product and trade-specific inspections
- Prepare general and project-specific proofs and documentation

Technical competences:

Upon successful completion of the sub-module, students will have the competences to:

- Identify and implement the performance target from contracts, bills of quantities and plans
- Carry out projects of small and medium size, taking into account all occupational safety and environmental requirements
- Take a holistic view of planning and execution processes
- Identify and avoid waste in the sense of Lean construction
- Promote the digitalisation of construction processes
- Implement new business models for circular construction

Applicability in this and other Programs

BPP-16 Project Management 1

BPP-21 Commercial Management

BPP-26 Seminar on Project Management

BPP-31 Building in existing structures

All similar courses in civil engineering

Entrance Requirements

Learning Content

- Building organisation/ building processes
- Project execution
- Deployment of installation partners and subcontractors
- Instruction of staff
- Inspections during construction
- Keeping evidence
- Occupational safety and environmental protection regulations

- Lean construction management - detailed scheduling
- Circular construction
- Digitalisation

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- Sven Schirmer, Bau-Projektmanagement für Einsteiger, Aufgaben ? Projektorganisation ?Projektablauf, Springer Verlag
- Christian Hofstadler, Christoph Motzko, Agile Digitalisierung im Baubetrieb ? Grundlagen, Innovationen, Disruptionen und Best Practices, Springer Verlag
- Baldwin, Mark, Der BIM-Manager, Praktische Anleitung für das BIM-Projektmanagement (The BIM Manager: A Practical Guide for BIM Project Management) buildingsmart, Mensch&Maschine, Springer Verlag
- Institut für Konstruktives Entwerfen der ZHAW, Bauteile wiederverwenden. Ein Kompendium zum zirkulären Bauen, Park Books

BPP-18 Digital Building Process (BMI 4D to 6D)

Module code	BPP-18
Module coordination	Prof. Dr. Matthias Hümmer
Course number and name	BPP-18 Digital Building Process (BMI 4D to 6D)
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

- Basic knowledge of BIM dimensions
    - 3D: Three-dimensional modelling | Difference between CAD software and BIM authoring systems
    - 4D: Time management | Preparing schedules for monitoring and managing of construction phases (target / actual comparisons)
    - 5D: Cost planning | Cost control, verifiable scale, billing etc.
    - 6D: Sustainability and efficiency | ecological, economic and social sustainability
- Basic knowledge of employer information requirements (EIR) and BIM execution planning (BEP)

- Basic knowledge of roles and responsibilities in a BIM project
- Basic knowledge of change management (human factor)
- Basic knowledge of the most important BIM case studies (see annex)
- Basic knowledge of openBIM and the buildingSMART standards
    - IFC Industry Foundation Classes
    - MVD Model View Definition
    - IDM Information Delivery Manual
    - BCF- BIM Collaboration Format
- Basic knowledge of model types, coordination and collaboration platforms | DALUX, BIM360
- Basic knowledge of lean management (last planner system, cycle planning, short-cycle communication)
- Basic knowledge of 3D calculation, DIN276 cost categories and model-based tenders
- Basic knowledge of sustainability (recycling management, buildings as future dumping grounds for raw materials, etc.)

Skills:

After successful completion, students will be able to determine and confidently apply the necessary BIM project objectives such as *collision-free planning, improved determination of quantities, improved comparison between target and actual figures or optimisation of documentation and revision files.*

In this case will be are able to decide between the various tools (*which are not always compatible with each other*) to decide on the case studies in which software tools can be used to achieve the best outcome.

Competences:

- Recognises what measures are required to provide 4D, 5D, 6D requirements with the relevant BIM case studies. Can formulate and illustrate this together with other trades / companies in a BIM execution plan (BEP).
- will be able to counter the loss of information when transferring data from, for example, the draft (planning) for the construction company (execution) with the (partner) BIM method.
- will be able to evaluate BIM tools and to use the correct tools for the construction project.
- will be able to remedy a lack of communication between construction management and the supplier using CDE and regular discussions.
- will be able to work in a collaborative team that works in line with BIM methods

Applicability in this and other Programs

Building Informatics BPP-05

Civil Engineering, Architecture

Entrance Requirements

Successful completion of the following modules is recommended
CAD 2D / 3D (BIM) BPP-12

Learning Content

Technical terminology, information models, model structure, LODs (degree of detail)
Standards:

- DIN EN ISO 19650
- VDI Series 2552
- DIN EN 17412
- DIN 276
- DIN EN ISO 29481

Certification programme "Professional Certification - Foundation" by buildingSMART and the VDI Guidelines
LOIN information at the desired depth
LOD (degree of development) + LOG (geometric detailing) + LOI (Completion of alphanumerics / attribution)
Planning phases
LOD 100 Concept Design,
LOD 200 Schematic Design,
LOD 300 Detailed Design AS-PLANNED
LOD 350 Construction Documentation,
LOD 400 Fabrication and Assembly,
LOD 450 Workshop Planning Release for Execution
LOD 500 Stock planning AS-BUILT
LOD 600 Building Operations
Process Management
BPMN 2.0 Business Process Model and Notation (http://bpmb.de/poster)
Basic knowledge of databases
Basic knowledge of IOT

Teaching Methods

Lecture, exercises and examples, practice project

Remarks

Recommended Literature

- Der BIM Manager - Praktische Anleitung für das BIM-Projektmanagement Beuth
- Digitales Bauen mit BIM Use Case Management im Hochbau Beuth
- IFC image comments according to DIN 276 BKI
- BIM und Lean Management in der Praxis bSD Verlag
- Basiswissen zu Auftraggeber-Informationsanforderungen (AIA) bSD Verlag
- BIM Das digitale Miteinander Planen, Bauen und Betreiben in neuen Dimensionen Beuth
- Integrierte Projektabwicklung Ein Leitfaden für Führungskräfte GLSI
- BIM und Recht Grundlagen für die Digitalisierung im Bauwesen Wolters Kluwer
- BIM-Leistungsschnittstellen DVP Deutscher Verband für Projektmanagement in der Bau- und Immobilienwirtschaft e.V

BPP-19 Scientific Methods

Module code	BPP-19
Module coordination	Prof. Dr. Tobias Bader
Course number and name	BPP-19 Scientific Methods
Lecturer	Prof. Dr. Tobias Bader
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	3
ECTS	3
Workload	Time of attendance: 45 hours self-study: 45 hours Total: 90 hours
Type of Examination	report/presentation
Weighting of the grade	3/210
Language of Instruction	English

Module Objective

Professional Competence

Knowledge
Students are able to:

- Assess interdisciplinary scientific research topics and applications
- Discuss underlying theories of research models
- Explain strategies of research problem analysis
- Describe structure of scientific and technical publications

Skills
Students are capable to:

- Address theoretical and/or experimental work for solving practice-oriented problems

- Plan and structure project work and evaluate work in progress
- Address research questions with quantitative research methods
- Analyse data and critically evaluate and interpret the results
- Document scientific work and results, present and discuss them
- Apply citation and referencing standards
- Structure and conceptualize reports and scientific papers

Personal competence

Social competence
The students will be able to:

- Apply concepts and models of intercultural communication for higher effectiveness in international environments
- Communicate and collaborate successfully and respectfully with others in a team
- Have constructive professional discussions
- Do collaborative work on a small research project and deliver results
- Present and defend the results of their work

Autonomy
The students will be able to:

- Apply theoretical concepts to practical applications
- Acquire knowledge in a specific context independently and to map this knowledge onto other research fields

Applicability in this and other Programs

Project Work, Bachelor Thesis

Entrance Requirements

Learning Content

The module provides the basics for developing skills and competences in applying scientific and research methods in both individual and collaborative working contexts focusing on:

- Introduction to methods in scientific work
- Code of ethics of engineers, plagiarism
- Working in collaboration with others in a multicultural international environment
- Planning research work efficiently: planning and scheduling
- Methodical and systematic approach to the handling of complex tasks

- Introduction to quantitative research methods
- Processing and presenting scientific data and results
- Dissemination of results, written and oral communication
- Practicing in teams addressing simple research questions under the form of small research projects
- Writing technical reports and scientific papers
- Oral presentation of the work and discussion of the results

Teaching Methods

Students are closely cooperating to carry out a small research project as a team work which they document as a first written paper. Applying the taught content into a practical work the students are training their competences acquired during their studies, and in the first part of the course, in a self-responsible and self-guided manner, fulfilling to specific tasks of the small projects.
Team work also includes promoting intercultural competence development by reflecting on personal identities and differences, principles of collective strength and advantages of being supported by a team. The module addresses language used depending on the context, what favours and inhibits communication, how to deal with critical situations as well as on attributions, responsibilities within a collaborative team working, among others

Remarks

none

Recommended Literature

- Kate L. Turabian, A Manual for Writers of Research Papers, Theses, and Dissertations, 8th Ed., Chicago Press 2013
- Charles Lipson, How to Write a BA Thesis: A Practical Guide from Your First Ideas to Your Finished Paper, Chicago Press 2005
- Dalgaard, P. Introductory statistics with R, Springer 2008

BPP-20 Compulsory Elective of a General Academic Nature (AWP)

Module code	BPP-20
Module coordination	Tanja Mertadana
Course number and name	BPP-20 Compulsory Elective of a General Academic Nature (AWP)
Lecturer	Dozierende für AWP und Sprachen
Semester	3
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	2
ECTS	2
Workload	Time of attendance: 30 hours self-study: 30 hours Total: 60 hours
Type of Examination	See examination schedule AWP and languages, written student research project, written ex. 60 min.
Duration of Examination	60 min.
Weighting of the grade	2/210
Language of Instruction	German

Module Objective

This AWP (compulsory elective subject of a general academic nature) elective module enables students to acquire knowledge and skills in subject areas beyond the scope of their chosen degree programme.

Students can choose both face-to-face courses and courses offered by the Virtuelle Hochschule Bayern (VHB). Students acquire knowledge and skills in the following areas:

- in a foreign language (language skills)

- in the didactic-pedagogical area (methodological skills)
- in the social sciences (social skills)
- in the psychological-sociological field (social skills)
- in the technical and scientific field (professional skills)
- in the philosophical-social-ethical area (personal skills)

Students are free to choose their courses from the list of elective (AWP) courses offered to expand their knowledge according to their own preferences.

Applicability in this and other Programs

Applicable in other degree programmes.

Entrance Requirements

Successful completion of the following modules is recommended.

In order to attend advanced language courses, students need to present the required language skills (e.g. by successfully completing of the previous level).

Elective (AWP) courses may not have any overlapping content with the student's current degree programme.

Learning Content

The course content can be found in the corresponding course description on the Language and Electives Centre homepage:
https://www.th-deg.de/en/students/language-electives#languages

Teaching Methods

The teaching and learning methods can be found in the corresponding course description on the Language and Electives Centre homepage:
https://www.th-deg.de/en/students/language-electives#languagesFormularende

Remarks

For course-specific details, please refer to the corresponding course description on the Language and Electives Centre homepage:
https://www.th-deg.de/en/students/language-electives#languages

All language courses require a compulsory attendance rate of 75% in order to be allowed to take the examination.

Recommended Literature

Recommended reading can be found in the corresponding course description on the Language and Electives Centre homepage:
https://www.th-deg.de/en/students/language-electives#languages

BPP-21 Commercial Management (Method of Measurement, Invoicing)

Module code	BPP-21
Module coordination	Prof. Dr. Roland Augustin
Course number and name	BPP-21 Commercial Management (Method of Measurement, Invoicing)
Semester	4
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- VOB (German construction contract procedures) Part B and Part C
- Types of building contracts
- Types of invoices
- Invoicing in the building industry and invoice components
- Performance assessment on site
- Insight into the basics of cost and performance accounting

- Securities (e.g. guarantees) in construction depending on the contract phase
- Project monitoring

Skills:

Upon successful completion of the sub-module, students will be able to:

- Carry out building work reviews promptly and systematically in the form agreed in the contract
- Arrange for invoices to be issued with evidence of the type and scope of the work, the required quantity calculations, drawings and other supporting documents
- Identify invoicing provisions in the technical terms of contract and other contractual documents, e.g. bill of quantities
- Carry out technical checks on invoices from partner companies
- Manage supplemental services
- Track operations
- Monitor default risk (client and supply chain)

Technical competences:

Upon successful completion of the sub-module, students will have competences in the following:

- Digital quantity determination and construction invoicing
- Correct application of VOB Part B and Part C
- Types of invoice, auditable invoice and its components
- Evidence of the type and scope of performance for invoicing purposes
- Overview of the various securities (e.g. construction guarantees) and the impact and application of these depending on the contract phase
- Accounts receivable and accounts payable as well as project monitoring

Applicability in this and other Programs

BPP-16 Project Management 1

BPP-17 Project Management 2
BPP-26 Seminar on Project Management
BPP-31 Building in existing structures

BPP-23 Product Management 1

BPP-35 Produkt Management 2

All similar courses in civil engineering

Entrance Requirements

No prerequesites besides school level math.

Learning Content

- Fundamentals of construction management and construction business management
- Types of building contracts
- Accounts receivable and accounts payable
- Accounting, payment of security deposits
- Certificates (e.g. exemption certificate, UST 1 TG)
- Partial invoices, supervision invoices, final invoices and counter-invoices
- Administration (hourly wage work)
- Securities (e.g. guarantees)
- Management of supplemental services

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- VOB (German construction contract procedures)
- Ralf Schöwer, Das Baustellenhandbuch ? Aufmaß und Mengenermittlung, Forum Verlag Herket

BPP-22 Law 2 (EU Construction Product Regulations)

Module code	BPP-22
Module coordination	Prof. Dr. Roland Augustin
Course number and name	BPP-22 Law 2 (EU Construction Product Regulations)
Semester	4
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- The amendment to building regulations and its impact on practice
- The organisation and structure of the Construction Products Regulation (EU) No. 305/2011
- The organisation and structure of the Model Administrative Regulation on Technical Building Regulations (MVV TB) and the Model Building Code (MBO)
- The correct planning and tendering of construction products
- Safe handling of European harmonised construction products

- The necessity and significance of declarations of performance

Skills:

Upon successful completion of the sub-module, students will be able to:

- Identify and evaluate the required building product specifications from tendering, contracting and the use of building products
- Derive the required building product specifications with the help of the MVV TB
- Prepare the building documentation for the approval authority or inspectors in the context of building supervision
- Submit a declaration of performance to assume responsibility for compliance with the essential performance characteristics of the building product

Competences:

Upon successful completion of the sub-module, students will have competences in the following:

- Knowledge of the conditions for the provision of harmonised building products on the European internal market with regard to the basic requirements for construction works
- Concrete application of building regulations (MBO and MVV TB)
- Proof of proper building execution by means of correct and comprehensive building documentation

Applicability in this and other Programs

BPP-23 Product Management 1

BPP-24 Product Development/ - testing

BPP-33 Project Seminar Product Development

BPP-35 Product Management 2

All similar courses in civil engineering

Entrance Requirements

Learning Content

- Fundamentals of building products law
- Amendment of building products law
- Usability and applicability of building products and types of construction
- Building documentation

- Concretisation of building requirements
- Liability risks and responsibility of planners and contractors
- Practical examples of product-related building execution

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

Recommended reading:

- Lecture script
- Regulation (EU) No. 305/ 2011 (Building Products Regulation)
- Model Building Code (MBO)
- Model Administrative Regulation on Technical Building Regulations (MVV TB) from the Deutsches Institut für Bautechnik (DiBt)
- E. Eng. M. Sc. Patrick Gerhold, Bauproduktenrecht in der Praxis. Von der Bauproduktleistung bis zur Baudokumentation, RM Rudolf Müller

BPP-23 Product Management 1 (International Product Strategy)

Module code	BPP-23
Module coordination	Prof. Dr. Roland Augustin
Course number and name	BPP-23 Product Management 1 (International Product Strategy)
Semester	4
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- Process steps from the product idea to the market launch (product roadmap)
- Product distribution channels such as trade and specialised product lines, processors, building industry and online trade
- Product management at national level

- Additional factors such as "foreign" market environments, company and product-related elements for international markets
- Market observation, requirements gathering, market introduction and product controlling

Skills:

Upon successful completion of the sub-module, students will be able to:

- Define product target figures such as technical features, pricing policy and design
- Coordinate and control the product development process
- Identify standardisation and/or differentiation in corporate and product strategy relating to product, brand, packaging and range
- Achieve country-specific product architecture through configuration rather than through the creation of technical variants

Competences:

Upon successful completion of the sub-module, students will have competences in the following:

- Specific product/industry and marketing knowledge as well as management skills
- Cross-national ways of thinking and acting with regard to raw materials, product, location and industry
- Alignment of alternative actions in the areas of international product management based on the framework conditions a company is confronted with
- Development, control and organisational integration of market services offered in the international marketplace

Applicability in this and other Programs

BPP-24 Product Development/ -testing

BPP-33 Seminar on Product Development

BPP-35 Product Management 2
BPP-36 Green Building

All similar courses in civil engineering

Entrance Requirements

Learning Content

- International marketing, management and international forms of organisation
- Market research
- Branding
- Marketing controlling
- New product development
- Inter-cultural communication
- Business presentation

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- Erwin Matys, Praxishandbuch

BPP-24 Product Development and Tests

Module code	BPP-24
Module coordination	Alexander Siebel
Course number and name	BPP-24 Product Development and Tests
Semester	4
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basic knowledge about component and material properties:
  - strength (tension/pressure/bending/shearing)
  - reaction to fire
  - thermal and hygric properties
  - VOCs and pollutants
- Overview of laboratory test processes to determine properties

Skills:

With the acquired knowledge, students should be able to

- analyse necessary material properties for the intended purpose

- develop measures in order to adapt material properties
- handle and analyse recycling materials

Competences:

After successful completion, students will be able to:

- develop product ideas
- use SWOT analysis for strategic planning and implementation
- handle and analyse recycling materials, particularly safety aspects and quality assurance

Applicability in this and other Programs

Civil Engineering

Entrance Requirements

Successful completion of the following modules is recommended.

Modules 11, 02, 09, 10, 04

Fundamental of Building Physics 1 BPP-02

Structual Enigneering BPP-04

Fundamentals of Building Physics 2 BPP-09

Fundamentals of Building Physics 3 BPP-10

Building Material Characteristics BPP-11

Learning Content

Construction and product development processes

- Preparation of product requirement profiles
- Preparation of the product specification
- Determination and carrying out required product testing

Determination of quality controls and monitoring product safety

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

Standards:
relevant testing standards, requirements from standard building regulations

References:
Course handouts

BPP-25 Construction Material Tests

Module code	BPP-25
Module coordination	Alexander Siebel
Course number and name	BPP-25 Construction Material Tests
Semester	4
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basic knowledge about the following:
  - mechanical, technological test processes
  - destructive and non-destructive tests
  - structural tests
- laboratory awareness and handling test equipment
- principles of measurement uncertainty and monitoring test equipment

Skills:

With the acquired knowledge, students should be able to

- establish decision-making criteria for selecting tests
- determine selection criteria for the choice of test specimens

- evaluation and illustration of measurement results

Competences:

After successful completion, students will be able to:

- understand the principles of material testing
- determine monitoring plans for material and quality inspections
- handle measurement uncertainties in classification

Applicability in this and other Programs

Civil Engineering

Entrance Requirements

Successful completion of the following modules is recommended.

Fundamentals of Building Physics 1 (Thermal Protection) BPP-02

Fundamentals of Building Physics 2 (Fire Protection) BPP-09

Fundamentals of Building Physics 3 (Building and Room Acoustics) BPP-10

Building Material Characteristics BPP-11

Structural Engineering BPP-04

Learning Content

Construction material tests

- Principles of mechanical, technological test processes
- principles of structural tests
- destructive and non-destructive tests
- selection and handling of test samples
- handling laboratory equipment
- determining measurement uncertainty

laboratory management according to DIN EN ISO 17025

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

Standards:
DIN EN ISO 17025 measurement and testing standards
Course handouts

BPP-26 Seminar on Project Management

Module code	BPP-26
Module coordination	Prof. Dr. Matthias Hümmer
Course number and name	BPP-26 Seminar on Project Management
Semester	4
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	report/presentation
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

The project seminar is committed to the practice-oriented teaching concept of
of the BPP degree programme by enabling students to consolidate the theoretical knowledge acquired in the modules focusing on building processes, as well as to test the further development of practical skills in the field of project management.

The project seminar is intended to give students the opportunity to put what they have learned from theory into practice while they are still in training.

Knowledge:

The project seminar provides the participants with knowledge about:

- Targeted application of theoretical knowledge in practice
- Principles, processes and tools of project management
- Independent familiarisation with a new field of work

Skills:

Upon successful completion of the project seminar, students will be able to:

- Apply systematic approaches in practical work
- Manage a project or part of a project independently
- Present and communicate results of work verbally or digitally
- Document the course and results of the project in the form of a report

Competences:

After successful completion of the project seminar, students will have the competences to:

- Work in a task-oriented manner in small mixed groups, using different skills
- Prioritise tasks
- Escalate problematic issues
- Reflect on knowledge
- Share their own applications and sustainable ideas
- Structure, plan and execute tasks around a new project
- Be willing to compromise in teamwork
- Re-plan when problems cannot be solved

Applicability in this and other Programs

BPP-33 Seminar on Product Developmenrt

Entrance Requirements

Successful completion of the following modules is recommended.

BPP-14 Law 1
BPP-15 Construction Calculation
BPP-16 Technical Execution 1
BPP-17 Technical Execution 2
BPP-18 Digital Building Process
BPP-21 Commercial Management

Learning Content

- Students work in teams on real building projects
- The team size varies (depending on the project) between 2 and 8 students
- A predefined task must be structured and executed
- The results must be presented and documented
- The task may consist of and/or combine content from the modules:
- BPP-14 Law 1 (Building law, building contracts VOB)
- BPP-15 Construction Costing (Tender, labour costing)
- BPP-16 Technical Execution 1 (Project management)

- BPP-17 Technical Execution 2 (Building organisation, Lean)
- BPP-18 Digital Building Process (BIM 4-D to 6-D)
- BPP-21 Commercial Management (Measurement, billing)

Teaching Methods

Lectures / exercises / tutorials / home work/ group in work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

Depending on the individual project

BPP-27 Internship including PLV seminars

Module code	BPP-27
Module coordination	Alexander Siebel
Course number and name	BPP-27A Internship BPP-27B PLV Seminar 1 BPP-27C PLV Seminar 2
Semester	5
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	30
Workload	Time of attendance: 0 hours self-study: 780 hours Total: 780 hours
Type of Examination	practical experience report
Weighting of the grade	30/210
Language of Instruction	German

Module Objective

Professional Competence

Knowledge

- Understand the processes and procedures of a company.
- Understand the requirements in the professional live.
- Understand basic techniques around application preparation, presentation and communication.

Skills

- Ability to apply gained knowledge in a professional/commercial setting.
- Ability to access new work areas.

- Ability to evaluate real-life problems and to design and apply solution approaches.
- Ability to evaluate and explain the achievements and learnings.

Personal Competence

Social competence

- Ability to integrate into teams with more experienced professionals.

Autonomy

- Succeed professionally in a new environment.
- Learn how to autonomously achieve results.
- Learn how to gain a position in industry.

Applicability in this and other Programs

Applicable in all technical programs with practical semester.

Building Material Characteristics BPP-11

Entrance Requirements

For internship: 90 ECTS and PLV1 finalized.

For PLV2: Internship finalized.

Successful completion of the following modules is recommended:

Fundamentals of Building Physics 1 (Thermal Protection) BPP-02

Fundamentals of Building Physics 2 (Fire Protection) BPP-09

Fundamentals of Building Physics 3 (Building and Room Acoustics) BPP-10

Learning Content

PLV 1 seminars: Seven workshops, thereof four in the personal competence area and three in the professional competence area (to be selected from the overall course offering of the International Office and Career Services).

Workshops include:

- Application skills
- Interview training
- Communication training
- Presentation trainings
- MS-Office trainings
- Intercultural training
- Job skills
- Pyramidal communication

PLV 2 seminar: One week of training in advanced presentation techniques and communication. Each student has to give a 20 minute presentation on the content of his/her internship.

Internship: 18 week full time internship in a field which is related to Building Products and Processes. The internship can be planned with any German company or a research institute. Student's who want to do the internship in an international context need to get approval by the Practical Responsible Professor. The Practical Responsible Professor decides on whether a job is accepted for the internship.

Teaching Methods

Seminaristic workshops.

Practical work.

Recommended Literature

Depends on subject of internship.

BPP-28 Building Trades 1 (Shell and Core Construction / Steel Construction / HVAC / Energy

Module code	BPP-28
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-28 Building Trades 1 (Shell and Core Construction / Steel Construction / HVAC / Energy
Semester	6
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basic knowledge about the following:
  - solid, timber, and steel constructions
  - dimensions and legal / structural requirements
  - heating and ventilation technology
- energy concepts and the use of renewable energies
- monitoring and automation (Smart Building)

Skills:

With the acquired knowledge, students should be able to

- select from and apply the various construction designs
- develop energy concepts for existing and new stock
- save energy whilst enhancing safety and comfort by using Smart Building principles

Competences:

After successful completion, students will be able to:

- select and plan safe structural designs
- evaluate and analyse the planning of building services
- exploit the benefits and opportunities of Smart Building in a targeted manner

Applicability in this and other Programs

Building Material Characteristics BPP-11

Civil Engineering, Architecture

Entrance Requirements

Successful completion of the following modules is recommended.

Fundamentals of Building Physics 1 (Thermal Protection) BPP-02

Fundamentals of Building Physics 2 (Fire Protection) BPP-09

Fundamentals of Building Physics 3 (Building and Room Acoustics) BPP-10

Semester 1 - 4

Learning Content

Building trades 1 (shell and core construction/steel construction/HVAC/energy)

- Principles of solid, timber, and steel constructions
- Principles of energy supply
- Principles of heating distribution and ventilation

Smart Building (energy, adaptation to users)

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

References:
Baukonstruktion ? vom Prinzip zum Detail: Band 1 Grundlagen; José Luis Moro
Handbuch der Gebäudetechnik ? Planungsgrundlagen und Beispiele: Band 2: Heizung, Lüftung, Beleuchtung, Energiesparen; Wolfram Pistohl, Christian Rechenauer, Birgit Scheuerer
Course handouts

BPP-29 Building Trades 2 (Interior Fit-out)

Module code	BPP-29
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-29 Building Trades 2 (Interior Fit-out)
Semester	6
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio (With planned room)
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Students will acquire

- basics knowledge about the following:
  - bearing and non-bearing walls
  - dry-lining wall systems
  - floor systems (screed systems, raised floors, compound screeds)
  - floor and wall coverings
  - doors and window systems
- selection criteria for planning

Skills:

With the acquired knowledge, students should be able to

- analyse designs and the choice of products
- prepare and analyse detailed plans
- monitor construction and the installation situation during the construction phase

Competences:

After successful completion, students will be able to:

- develop cost-effective, sustainable systems based on the construction project
- draw up requirements for the designs
- plan and monitor safer structural designs

Applicability in this and other Programs

Building Material Characteristics BPP-11

Civil Engineering, Architecture

Entrance Requirements

Successful completion of the following modules is recommended.

Fundamentals of Building Physics 1 (Thermal Protection) BPP-02

Fundamentals of Building Physics 2 (Fire Protection) BPP-09

Fundamentals of Building Physics 3 (Building and Room Acoustics) BPP-10

Semester 1 - 4

Learning Content

Building Trades 2 (Interior Fit-out)

- non-bearing partition systems (lightweight construction: wood, metal, glass, plasterboard, masonry)
- suspended ceilings (metal, timber, mineral fibre, plasterboard, hybrid designs, plastic, textiles)
- door / gate systems and flap systems (materials as above)
- floor systems (screed systems (brick wall and dry lining, cavity floor, raised floors)

as well as the installation methods/interfaces for using integrated cavities for technical matters such as electricity, ventilation, water and wastewater.

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

References:
Current lecture script, Trockenbauhandbuch from VOB-Verlag Ernst Vögel, system notes from relevant product manufacturers
Course handouts

BPP-30 Building Trades 3 (Building Envelope / Roof)

Module code	BPP-30
Module coordination	Alexander Siebel
Course number and name	BPP-30 Building Trades 3 (Building Envelope / Roof)
Semester	6
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

Knowledge of construction principles as well as physical and static requirements of windows, façades, ETICS and roof structures, even regarding professional planning of details alongside the design.

Knowledge of national and European test processes and classification systems for elements as well as post and beam façades.

Will know the technical regulations for professional planning and design of glazing in façades and roof constructions.

Skills:

Skills such as designing the construction for the façade, ETICS and roofs,
such as:

1 Connection details to the building
2 Accurate measurement of the water shedding level / resistance to driving rain
3 Prevention of condensation
4 Air and diffusion density
5 Thermal bridge analysis (pre-measurement)
6 Wind, dead water pre-measurement
7 Site and assembly plans
8 Accurate measurement of glass

Competences:

The will students acquire the ability to safely plan the building envelope (façade + roof) in detail along with all requirements, to prepare a performance specification, and to coordinate or monitor assembly, such that the end result is an outcome that is ready for acceptance. In this case the focus is on designs for new buildings as well as energy-related renovation of residential and non-residential units. Improper execution will be recognised and corresponding measures will be taken.

Applicability in this and other Programs

Building Material Characteristics BPP-11
Civil Engineering, Architecture

Entrance Requirements

Successful completion of the following modules is recommended.
Fundamentals of Building Physics 1 (Thermal Protection) BPP-02
Fundamentals of Building Physics 2 (Fire Protection) BPP-09
Fundamentals of Building Physics 3 (Building and Room Acoustics) BPP-10
Semester 1 - 4

Learning Content

Will have acquired knowledge of typical façades - and roof systems in detail and will be able to confidently evaluate thermal insulation performance, diffusion density or openness, resistance to driving rain, prevention of condensation with

1 Rear-ventilated façade designs
2 ETICS (flammable/non-flammable)
3 Post and beam façades

4 Wood, aluminium and plastic windows
5 Double façades
6 Modular element façades, pre-fabricated ex-works (steel, aluminium, timber, glass designs)
7 Cold/warm roofs (hard and soft roofing), with and without a gradient (including green roofs)
8 Roof sealing systems with appropriate rainwater drainage systems

Teaching Methods

Lecture, exercises and examples

Remarks

Recommended Literature

Lecture notes and recommended literature from the lecture, specialist information from the WDVS and VhF associations, DiBt regulations/notes

BPP-31 Building in Existing Structures (Structural Damage, Removal / Demolition, Renovation)

Module code	BPP-31
Module coordination	Alexander Siebel
Course number and name	BPP-31 Building in Existing Structures (Structural Damage, Removal / Demolition, Renovation)
Semester	6
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	written ex. 90 min.
Duration of Examination	90 min.
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- The controlled demolition of buildings
- taking into account waste and hazardous materials legislation
- and the recognised rules of technology.
- Materials containing hazardous substances, exploration, removal, separation, disposal Possibilities of recycling construction waste into pure and high-quality recyclable materials.

Skills:

Upon successful completion of the sub-module, students will be able to:

- have a practical overview of the proper and safe removal of materials containing pollutants prior to demolition and the highest possible recycling of construction waste by type
- apply the technological steps in exploration, assessment and disposal. The focus is on controlled deconstruction
- use knowledge of methods to assess and evaluate the analysis of contaminated sites. This and the acquired understanding of the chemistry of contaminated sites make it possible to objectify hazard potentials

Competences:

Upon successful completion of the sub-module, students will be able to:

- classify general analytical and contamination-specific publications
- describe the obligation to recycle usable waste according to the basic sequence of action ?avoid-recycle-dispose?
- use basic terms and parameters of analytical chemistry and site contamination issues that are independent of the profession

Applicability in this and other Programs

Construction Chemistry BPP-03

Structual Engineering BPP-04

Building Material Characteristics BPP-11

All similar courses in civil engineering

Entrance Requirements

Successful completion of the following modules is recommended.

BPP-03 Construction Chemistry
BPP-11 Building Material Science

BPP-25 Construction Material Tests

Learning Content

- Contaminated sites in Bavaria / Germany
- Important pollutants/pollutant groups
- Protected resources and impact pathways
- Investigation of contaminated sites, risk assessment
- Disposal/recycling
- Occupational safety

- Pollutants in the building fabric
- Exploration of the building
- Evaluation of the exploration results
- Disposal
- Recycling management

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- Kreislaufwirtschaftsgesetz (German Closed Substance Cycle & Waste Management Act (KrWG)/ Verordnung zur Vereinfachung des Deponierechts -Deponieverordnung DepV (Ordinance on the Simplification of Landfill Law - Landfill Ordinance
- Verordnung über das Europäische Abfallverzeichnis - Abfallverzeichnis-Verordnung ? AVV (Ordinance on the European list of wastes) Nachweisverordnung - NachwV (Ordinance on waste recovery and disposal records)
- Länderarbeitsgemeinschaft Abfall (LAGA) (Working group of the federal states on waste)
- Hazardous Substances Ordinance ? (GefStoffV)
- Chemicals Prohibition Ordinance ? ChemVerbotsV
- TRGS 524 ? Protective measures for activities in contaminated areas

BPP-32 Compulsory Elective 1 (FWP-1)

Module code	BPP-32
Module coordination	Prof. Markus Hainthaler
Course number and name	Entrepreneurship Strategic Planning and Project Management Financing and Accounting Process Safety Life Cycle Analysis and Ecobalancing Technology and Intellectual Property Rights Management SIVV Certificate IFRS and Organizational Law Process Optimization Architectural History and Theory Interdisciplinary Product Development Innovative Constructions and Building Products Applied AI in the Building Process Real Estate Investement Vernomimicry BPP-32 Compulsory Elective 1 (FWP-1)
Lecturer	Prof. Dr. Tobias Bader
Semester	6, 7
Duration of the module	2 semester
Module frequency	annually
Course type	compulsory course, required course
Level	Undergraduate
Semester periods per week (SWS)	64
ECTS	5
Workload	Time of attendance: 960 hours self-study: 1,440 hours Total: 2,400 hours

Type of Examination	report/presentation, written examination
Weighting of the grade	5/210
Language of Instruction	English, German

Module Objective

The Compulsory Elective I and II modules provide the students with the opportunity to address specialized topics, other than the mandatory courses of the main field of study, topics that are broadening by that their field of knowledge and skills in these areas.

Several courses will be offered for each Compulsory Elective module upon availability and attendance interest of students from the following pool:

- Architectural History and Theory
- Entrepreneurship
- Strategic Planning and Project Management
- Finance and Accounting
- Workplace Innovation
- Management Systems according to ISO
- Health Safety Environment
- Technoligy and Intellectual Property Rights Management
- Energy and Ressource Efficiency
- Operational Processes

Applicability in this and other Programs

BPP-27 Internship including PLV seminars

BPP-34 Bachelor thesis

The module is primarily intended for the Bachelor of Building Products and Processes but it can also be chosen by students of other fields of study.

Entrance Requirements

Please see the respective course descriptions for specific information on prerequisites.

Learning Content

Please see the respective course descriptions for specific information on content.

Teaching Methods

Please see the respective course descriptions for specific information on didactic methods employed.

Remarks

Please see the respective course descriptions for course-specific remarks.

Recommended Literature

Please see the respective course descriptions for literature references.

Entrepreneurship

Objectives

Module objectives

The students should learn an efficient and goal-oriented entrepreneurship management. Efficient and goal-oriented entrepreneurship management makes it necessary to implement structured business processes and use up-to-date, demand-oriented start-up methodologies.
Entrepreneurial Management understands how to identify, analyze and seize opportunities, turn big/smart data into business opportunities and take full advantage of the digital transformation, manage stakeholders and communication, surf on diversity and do business in emerging markets, manage growth and understand the fundamentals of business rules.
The students learn a systematic process of envisioning a desired future, and translating this vision into broadly defined goals or objectives and a sequence of steps to achieve them.

Entrance Requirements

no

Learning Content

The module considers business start-ups as a process from the identification and evaluation of opportunities, the procurement of relevant human and monetary resources, the establishment of an organization, to the management of a start-up. In

addition to theories and concepts, relevant practical methods to build a start-up team and procedures are taught to support this process.

Type of Examination

report/presentation

Methods

Seminaristic teaching / exercises / team work / home work

Recommended Literature

- Blank, S., The startup owner's manual: The step-by-step guide for building a great company . BookBaby, 2012
- Brown, T., Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation . Harper Collins, 2009
- Clark, T., Osterwalder, A., & Pigneur, Y.,. Business model you: a one-page method for reinventing your career . John Wiley & Sons, 2012
- Doz, Y. L., & Kosonen, M., Fast strategy: How strategic agility will help you stay ahead of the game . Pearson Education, 2008
- Drucker, P., Innovation and entrepreneurship . Routledge, 2014
- Maurya, A., Running lean: iterate from plan A to a plan that works . O? Reilly Media, Inc., 2012
- Osterwalder, A., & Pigneur, Y., Business model generation: a handbook for visionaries, game changers, and challengers . John Wiley & Sons, 2010
- Porter, M. E., & Advantage, C., Creating and Sustaining Superior Performance . New York, NY: Free press, 1985
- Ries, E., The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create RadicallySuccessful Businesses . Crown Publishing Group, 2011
- Wirtz, B. W. Business Model Management: Design - Instrumente - Erfolgsfaktoren von Geschäftsmodellen . Gabler Verlag, 2013
- Zollenkop, M., Geschäftsmodellinnovation: Initiierung eines systematischen Innovationsmanagements für Geschäftsmodelle auf Basis lebenszyklusorientierter Frühaufklärung . Springer-Verlag, 2009

Strategic Planning and Project Management

Objectives

Students will learn about the processes involved in planning and implementation of project in project management. Beginning with the process of building and leading project team, to project management theory and steps, to finally looking at the implementation of successful project management, this course aims to provide a complete picture of project management in practice. Additionally, different types of project management will be compared, so that the students will be able to apply the most effective method, based on the type of project and/or team that they are dealing with. A special focus will be placed on the elements of planning, leadership and implementation.

Professional Competence

Knowledge

After successfully finishing the module, students should:

- Understand project management theory and its application
- Understand all the steps involved in project management, with a focus on planning
- Understand the different roles involved with project management
- Understand how project management teams work together or are put together in different environments
- Understand how to choose the correct type of project management method for different types of projects
- Understand what successful leadership in and of project management looks like
- Understand the challenges and typical project fails in planning and implementation of project management

Skills

Upon completion of the module the students will be able to:

- Transfer theoretical knowledge of project management real world projects
- Be able to determine which project planning management method is most effective in different situations
- Be able to determine which project management implementation method is most effective in different situations
- Be able to recognize the most effective leadership technique for various project teams
- Be able to recognize the signs when a project is not working or failing
- Be able to work on different projects in various environments

Personal Competence

Social competence

Students will work together on an in-class projects in small groups, in order to learn how to work efficiently with each other on solve problems and on implementing their knowledge together. This aims at enhancing their team-working skills as well as their problem-solving capabilities. Further, these groups are lined-up in a way to be mixed multi-cultural in order to foster and fine-tune students? intercultural interaction capabilities.

Methodological competence

The students will learn how to transfer theoretical knowledge into a project, and hence, will be able to apply their learned skills. This leads to greater retention of the learned theory, and enables transference skills. Further, the students will be provided with an overview of different sets of skills and theory, and will be able to choose the most efficient approach to applying these. Students will develop an analytical system-oriented way of thinking and should able to structure the most effective approach to project management from different aspects, beginning with planning, selection, to implementation.

Entrance Requirements

English skills

Learning Content

The course will be taught with a focus specifically planning, leadership and implementation:

- Project management theories
- Project management planning
- Project roles and stakeholders
- Project management theories
- Project management steps
- Project management leadership
- Project management teams
- Project management implementation
- Project management fails

Type of Examination

report/presentation

Methods

Interactive lecture, case studies, in class project, group work, discussions and presentations of work in progress.

Recommended Literature

Recommended reading (if possible in the most current edition):

- Berkun, S., Making Things Happen: Mastering Project Management (Theory in Practice). Sebastopol, CA: O'Reilly Media, 2008
- Edge, J., Agile: An Essential Guide to Agile Project Management, The Kanban Process and Lean Thinking + A Comprehensive Guide to Scrum . Luxemburg: CreateSpace Independent Publishing Platform, 2018
- Kunow, A., Project Management & Business Coaching: Agile project management - target-oriented and efficient with active body language & comprehensive communication . Buchum, Germany: KISP Bücher, 2019
- Martinelli, R.J., Milosevic, D.Z., Project Management ToolBox - Tools and Techniques for the Practicing Project Manager . Hoboken: Wiley, 2016
- Project Management Institute (Hrsg.) A guide to the project management body of knowledge. PMBOK(R) Guide . Newtown Square, PA: Project Management Institute, 2013
- Sutherland, J., Scrum: the art of doing twice the work in half the time . London: Random House Business Books, 2015
- Wysocki, R., Effective project management: traditional, agile, extreme . Indianapolis, IN: Wiley, 2014

Financing and Accounting

Objectives

Professional and methodological Competence
Students develop a thorough understanding of basic accounting principles, can classify the functions of investment and financing into the operational sequences and apply their instruments.

Knowledge

- Students know and understand the essential features of financial and management accounting as well as the legal foundations and components of bookkeeping and accounting.
- Students have a deep understanding of financial reports as a basic skill for business studies.
- Students are familiar with central methodological foundations and instruments of investment and financing, can explain them and apply them to typical operational problems.

Skills

- Students are able to evaluate the impact of business transactions on financial accounting. In particular, students have a deep understanding of the effectiveness/neutrality of business transactions on financial statements, and execute accounting transactions independently.
- Students are able to prepare and analyze financial statements and management reports.
- In their professional practice, students can identify problem situations that require investment and financing solutions. They are able to independently find adequate solutions for these situations, to evaluate them and to question them critically.

Personal Competence

Social competence

- Students develop communication skills that are supported by tasks and case studies. They are familiar with the essential terminology of financial accounting and communicate about basic problems with other participants using the appropriate technical terms.
- Students are encouraged to discuss critical/controversial topics in an objective atmosphere.
- Students can present their analyses in a goal-oriented and application-oriented manner matching the target audience.
- Students are able to work problem/solution-oriented in small mixed groups, learning and broadening teamwork abilities.

Autonomy

- Students will be able to solve complex problems independently with application-related, fundamental knowledge of bookkeeping and accounting.
- Students know and understand the limitations, assumptions and problems of methods and instruments of investment and financing in a specific context. Students can independently choose and employ suitable valuation approaches for the respective task.
- Students are able to relate their acquired knowledge to other lectures and topics.

Learning Content

1. Accounting: information for decision making
2. Basic financial statements
3. The accounting cycle
4. Understanding financial statements and cash flow
5. Time value of money
6. Valuing stocks and bonds
7. Capital Budgeting

Type of Examination

report/presentation

Methods

Seminaristic teaching combining topic-oriented lectures, exercises, group work, group presentations, and classroom discussions.
Students are encouraged to actively participate in course by choosing appropriate didactical methods. They are strongly invited to discuss real-life problems and applications interactively throughout the lecture.
The seminar is accompanied by tutorials where calculation examples from the course are repeated for better understanding and examples similar to those used during course sessions are calculated.

Recommended Literature

Basic literature

- Williams J.R., Haka S.F., Bettner M.S., Carcello J.V.; "Financial & Managerial Accounting: The Basis for Business Decisions"; 17th internat. edition; New York: McGraw-Hill Education; 2015.
- Ross S.A., Westerfield R.W., Jordan B.D.; "Essentials of Corporate Finance"; 9th internat. edition; New York: McGraw-Hill Education; 2017.

Supplementary literature

- McLaney E., Atrill P.; "Accounting and Finance: An Introduction"; 9th edition; Harlow: Pearson Education; 2018.
- Gitman L.J., Zutter C.J.; "Principles of Managerial Finance"; 14th global edition; Harlow: Pearson Education; 2015.

Process Safety

Objectives

Module Objective

The students understand the importance of process reliability, its key concepts and practical approaches needed to avoid potentially catastrophic incidents and to improve the efforts in managing process hazards. Upon completion of this module the students should have the following competences:

Professional Competence

Knowledge

- Students understand and explain why and how these process safety systems have been implemented in some certain way, what they are intended to achieve, how to apply them daily to achieve safe and reliable operations, and possibly, how to improve them as needed.
- Students should know three essential parts of a process safety system that focus on general concepts of safety culture.
- They know safety pyramid with different levels and the way to define process risk. They are able to carry out a risk assessment considering the frequency and consequence.

- The students should identify different pictograms with specific hazard information. Students understand and explain typical barrier protection layer models.

- Operational disciplines should be well understood from both the organizational and personal point of view.
- The students are familiar with personal protective equipment and hazardous materials, as well as the fire explosion

Skills

- Ability to apply key concepts and methodologies to support effective process safety systems.
- Ability to transfer the knowledge to fill in potential gaps between the approaches presented in this course and the practices in facility.
- Ability to analyze the facilitys process safety program.

Personal Competence

Method competence:

After participating in this module, students will be able to understand safety culture and obey the safe guidelines in any working place. Based on the basic fundamental aspects of safety methodology, they can also meet and overcome the challenges that the safety is needed to be further updated as the technology develops, e.g. further maintaining/ improving the facilitys process safety program.

Personal and social competence :

- Students should be able to let themselves complete work safely everyday.

- They have the personal communication skills to find the potential hazard not only from themselves but also from the coworkers, thus prevent the incidents in the first place.

- They reflect their disciplines to use safely the hazardous materials and process.

Entrance Requirements

Learning Content

- Introduction to Process Safety and its importance
- Safety Culture, Safety Permit Systems
- Process Safety Systems, Process Risk Assessement
- Protection Layer Model (Swiss Cheese Model, Bow Tie Diagrams)
- Operational Discipline (Organizational and Personal OD)
- Personal Protective Equipment
- Gases, Vapors, Particulates, Toxic Metals, Hazards of Liquids
- Hazardous Chemical Identification
- Fire and Explosion

Type of Examination

written ex. 90 min.

Methods

seminaristic teaching / exercises / case study / home work

Recommended Literature

James A. Klein, Bruce K.: Process Safety: Key Concepts and Practical Approaches. CRC Press Taylor & Francis Group, 2017.
Charles E. Thomas Process Technology: Safety, Health, and Environment. Cengage Learning, 3rd Edition, 2011
Kahl A., Bier M.: Arbeitssicherheit: Fachliche Grundlagen, Erich Schmidt Verlag, 2019

Life Cycle Analysis and Ecobalancing

Objectives

Module Objective

The students should understand and comply with the mandated safety and environment subjects, and apply the enforced site safety rules for the technicians.

Professional Competence

The students know and understand the various hazards in the processing and manufacturing industry as the enormous amount of knowledge and economics involved in an entire plant?s safety, health, and environmental (SHE) infrastructure and administration. Students can reveal and implement the SHE rules to protest people, equipment, and potential profits form e.g. fires, explosion, and expensive litigation. The students are able to develop an intuitive understanding of safety culture.

Knowledge

Students are able to explain and reproduce the following basic theories, principles and practical applications:

- Understand the basic concepts of safety, with the focus on health and environment.
- Know where and how to find latest relevant knowledge, standards, regulations as well as research results.
- Use simple models to describe the different accident or incident scenarios
- Know the meanings of graphical symbols on hazard and warning signs.
- Understand and how to set priority of SHE concepts when dealing with the industrial process.

Skills

- Communication skill directly to safety engineers in a simple yet precise manner
- Ability to describe measures used to protect workers
- Ability to have creative thinking and development of the safety rules

Personal Competence

The students present and classify national and international standards and their enforcement and the student realizes there are severe penalties if a site fails to protect its workforce and surrounding community.

Social competence

The students are able to

- Express their arguments in a comprehensible way within a group in the field of safty technology.
- Reflect their knowledge, exchange their own applications and sustainable ideas

Autonomy

Students can

- Cover most government-mandated training and foundational aspects of apprentice technician safety training.
- Furthermore, they are able to evaluate and update these standards and rules.

Objectives explain what students know, understand, and can perform after completing the Module. The description should avoid repetition. For details see: Qualifikationsrahmen für Deutsche Hochschulabschlüsse and Handbook

Entrance Requirements

none

Learning Content

- Importance of process safety specifically for industries such as refining, petrochemicals, electric power generation, etc.
- Hazard Classification
- Routes of Entry & Environmental Effects
- Gases, Vapors, Particulates, & Toxic Metals
- Hazards of Liquids
- Fire and Explosion
- Respiratory Protection
- Electrical, Noise, Heat, Radiation, Ergonomic and Biological Hazards
- Personal Protective Equipment

Type of Examination

part of module exam, Portfolio

Methods

Seminaristic teaching / exercises / home work, document camera (visualizer) and additional lecture materials in iLearn.

Recommended Literature

- Speegle M., Safety Health and Environmental Concepts for the Process Industry, 2nd Edition, Delmar- Cengage Learning, New York, 2013
- Thomas, Charles E., Process Technology: Safety, Health, and Environment, 3rd Edition, Delmar- Cengage Learning, New York, 2012
- Deutsche Gesetzliche Unfallversicherung e.V. Machine Tool, Fire and Explosion Prevention and Protection , 2012

Technology and Intellectual Property Rights Management

Objectives

Professional Competence

Knowledge

- Understanding what intellectual property rights are
- Understanding the significance of intellectual property and technological Innovation in society
- Knowledge of basic principles and methods for intellectual property management
- Knowledge of basic principles n technology transfer
- Skills
- Students are able to apply theories and methods to :
- Identify intellectual assets
- Identify main types of intellectual property
- Prepare and evaluate an IP exploitation strategy
- Managing Intellectual property rights
- Technology transfer from University to Industry

Personal Competence

Social competence

- Students are able to work goal-oriented in small mixed groups, learning and broadening teamwork abilities.

Autonomy

- Develop analytical thinking, attention to details and ability to consider different strategies to solve individually problems related to this lecture.

Learning Content

- Introduction to Intellectual Property Rights
- Intellectual property rights management national and international environment
- World wide IPR management system, World Intellectual Property Organization (WIPO)
- International Treaties and Conventions on Intellectual Property
- The Impact of Technological Innovation on Society
- Protecting technical innovation: patents and trade secrets
- Intellectual property management in technology transfer

Type of Examination

report/presentation

Methods

Seminaristic teaching / exercises / team work / home work

Recommended Literature

- Melissa A. Schilling, Strategic management of technological innovation, 6th Ed., McGraw-Hill Education 2020
- Keith Goffin Palgrave, Innovation management : effective strategy and implementation, 3rd Ed., Macmillan Education 2017
- Intellectual Property Handbook: Policy, Law and Use, WIPO 2004 : https://www.wipo.int/about-ip/en/iprm/
- WIPO Technology Trends 2019 : https://www.wipo.int/publications/en/details.jsp?id=4386

SIVV Certificate

Objectives

The students should understand and apply the basic principles of the energy conversions, the technical aspects of energy and resource management. They will learn that the energy manager nowadays has many opportunities to reduce utility costs by using energy procurement strategies. With the focus on building, the students can understand and apply different energy and resources extensively with e.g. solar energy for heat and for electricity, geothermal energy, etc.

Entrance Requirements

basic mathematics and physics

Learning Content

Energy efficiency in gerneral

- Core concepts and basic points on resource and energy efficiency and management
- Basic calculations of energy efficiency for different power cycles

- Conventional fossil resources distributions, transport and utilization
- Efficiency and irreversible losses of apparatus and machinery drives: pumps, fans, blowers, compressors, heat exchangers, conveyors, indoor air quality
- Process analysis and optimization: energy benchmarks, heat integration, evaluation of alternative technology

Energy efficiency in the area of sustainable building

- technologies for the use of renewable energies
- Solar thermal energy for heat
- Solar panel (photovoltaic) for electricity
- Geothermal energy with heat pump
- Transmission heat losses
- etc.

Type of Examination

written ex. 90 min.

Methods

seminaristic teaching / exercises / tutorials / home work

Recommended Literature

- Yogi Goswami D.: Handbook of Energy Efficiency and Renew-able Energies, CRC Press, 2016
- Harvery, D., Energy and the New Reality 2: Carbon-Free Energy Supply, Eathscan, 2010
- Struchtrup, H., Thermodynamics and Energy Conversion, Springer, Heidelberg,2014,
- Demirel, Y., Energy: Production, Conversion, Storage, Conservation, and Coupling, 2016

IFRS and Organizational Law

Objectives

With focusing on organization, the students will be equipped with a thorough understanding by organization theory and together with management information systems.

Professional Competence

- Understand the principles of organizational arrangements
- Explain and demonstrate the organization structure, design, competitive strategies
- Assess the outside environments and how organizations can respond to them
- How to handle the operational information processing: fundamental management information systems concepts
- Applications of information systems in business practice
- Apply theoretical concepts to practical applications (case study)
- Understand the direct and indirect connection between information systems and business performance

Personal Competence

Methodological competence

The students will be able to use the organizational theory by knowing concepts, structures and strategies. Students are allowed to have in-depth look at how today's business firms use information technologies and systems to achieve corporate objectives.

Personal and social competences

- Students are able to develop analytical thinking, attention to details
- Students are able to consider and analyze different strategies to solve problems from the organization point of view
- Students are able to solve and discuss business problems in the field of information systems by applying systematic approaches and by identify alternative solutions in teams

Entrance Requirements

no prerequisites

Learning Content

- Nature of organizations and organization theory
- How strategies affect organization design
- Basic concepts of organization structure
- Major environmental forces on the organization
- Information systems in global business
- Information systems, organizations, and strategy
- IT infrastructure and emerging technologies
- Securing information systems

Type of Examination

written ex. 90 min.

Methods

seminaristic teaching / exercises / tutorials (case study) / home work

Recommended Literature

- Daft, R.L , Armstrong. A. . Organisation Theory and Design, Nelson Education, 2014
- Laudon K. C., Laudon J.P.,: Management Information Systems: Managing the Digital Firm, 13th Edition, Pearson, 2014.
- Schulz, O. Der SAP-Grundkurs für Einsteiger und Anwender, 2. Auflage, Galileo Press, 2013
- Eversheim, W., Organisation in der Produktionstechnik, Arbeitsvorbereitung, VDIVerlag, Düsseldorf
- Laux, H., Liermann, F.: Grundlagen der Organisation. Springer, 6. Aufl. Berlin 2005

Process Optimization

Objectives

Module Objective

Professional Competence

Knowledge

From the variety of engineering and management courses in the previous semesters, students are already capable to develop and design innovative building products for a wide range of applications. Another dimension for a successful and marketable building product lies both in ensuring its reliability and functionality during its whole lifetime, and the ability to manufacture this product efficiently, reproducibly and environment-friendly according to current quality standards on an industrial scale. This module therefore teaches the competences how to evaluate products according to their quality and reliability, and how to operate the respective production processes economically and optimize them holistically, with a special focus on sustainability and maximizing product quality while minimizing energy consumption. A wide range of optimization tools are presented that can be used in all phases of planning, operation and debottlenecking a plant.

Skills

After completing this module, students will be able to discuss all areas of quality optimizing a production plant both with technical and business experts. They understand the advantages and disadvantages of different optimization tools, their applicability limits and the required effort to realize them.

Personal and social Competence

The solution of the tasks given both in the lecture and the exam requires students´ self-responsible and self-directed working style. Herein, the concepts of all module topics have to be applied to new problems, analyzed regarding their relevance, and evaluated in order to yield a reliable result.

Entrance Requirements

Learning Content

Quality Engineering

o Process-oriented quality management
o ISO 9000 ff.
o Set-up and introduction of a quality management system
o Methods and tools of quality planning
o Total Quality Management
o Six Sigma Process
o Define, Measure, Analyze, Improve, and Control (DMAIC-framework)
o Statistical methods within the DMAIC-framework

Production Optimization

o Reliability Management (FTA)
o Process Integration: Process Economics, Global Optimality, Heat Exchanger Networks (Pinch Method)
o Environmental Design: Aqueous Contamination, Atmospheric Emissions, Life Cycle Analysis (LCA)

Type of Examination

part of module exam, written ex. 90 min.

Methods

The lecture focuses on seminaristic teaching, but also applies detailed practical exercises based on the theoretical background. The key content is conveyed in combination of a written script and slide and video presentations. All material is uploaded to an online learning portal (iLearn). The students are strongly invited to discuss real-life problems and applications interactively throughout the lecture. Tutorials will be offered on demand.

Recommended Literature

Quality Engineering

o T. Pyzdek "Quality Engineering Handbook", CRC Press

o G. Linß "Qualitätsmanagement für Ingenieure", Hanser, München-Wien

o Pfeifer "Praxisbuch Qualitätsmanagement", Hanser, München-Wien

Production Optimization

o B. Bertsche "Reliability in Automotive and Mechanical Engineering", 1st edition

o R. Smith "Chemical Process Design and Integration", 2nd edition

Architectural History and Theory

Objectives

Students learn about the historic development of architecture worldwide. Furthermore, they understand architectural theories and its development over time.

Based on case studies, the students understand the concept of architecture as cultural expression of its specific period.

Professional Competence

Knowledge

After successfully finishing the module, students will get to:

- Understand the development of architecture in its historic context
- Understand the complexity of architectural solutions
- Understand vernacular architecture and its concepts in the context of different climate zones
- Understand representative architecture and its specific political and social context
- Understand the drivers behind the development of urban structures and its specific results

Skills

Upon completion of the module the students will be able to:

- Describe basic concepts of architectural development in different regions and in its specific political, social and environmental context
- Describe different architecture styles, with focus on Europe
- Describe basic concepts of the historic development of urban structures, including its political, social and environmental context

Social competence

Students are demonstrating working individually or in small groups to solve problems that aim at enhancing their team-working skills as well as their problem-solving capabilities. Further, students also know how to analyze the perspective of historic stakeholders, understand their behavior and understand the architectural outcome.

Methodological competence:

The students improve the knowledge in the field of history of architecture based on case studies. The students should be enabled to apply the acquired knowledge and to critically evaluate and inter-present subject-specific information on the basis of criteria of architecture. Students develop an analytical system-oriented way of thinking and are able to structure the approach for analyzing historic buildings and historic urban structures.

Entrance Requirements

None

Learning Content

- Human development, buildings, urban structures from the very start
- Historic development of architecture in Europe and selected examples from different continents
- Historic development of urban structures in Europe and selected examples from different continents
- Architecture theory and its application

Type of Examination

written ex. 90 min.

Methods

Seminaristic teaching / Presentations / Case studies / Moderated discussions / Field trips

Recommended Literature

Conway, H., Roenisch, R. (2004) Understanding Architecture - An Introduction to Architecture and Architectural History. Routledge : New York / USA

Interdisciplinary Product Development

Type of Examination

Portfolio

Innovative Constructions and Building Products

Type of Examination

part of module exam, report and presentation

Applied AI in the Building Process

Type of Examination

part of module exam, Portfolio

Real Estate Investement

Objectives

Qualification goals:
In this module, students acquire fundamental knowledge and practical skills in real estate investments. The goal is to develop a comprehensive understanding of the real estate market, investment strategies, and financing models. To make the acquired knowledge more tangible, practical examples, due diligence assessments, property valuation, and real estate investment cases are discussed and applied. Furthermore, students will become

familiar with the influence of sustainability aspects and future trends in the real estate market.

Professional Competence

Knowledge

Upon completion of the module, students will gain knowledge in:

- Fundamentals of the real estate market and its functioning.
- Various investment strategies and valuation methods.
- Insight into sustainability aspects and their importance in real estate investments.
- Methods for conducting real estate due diligence assessments.
- Principles of real estate financing and business models.
- Risk assessment and market cycles.
- Future trends in the real estate sector.

Skills

After successfully completing the module, students will be able to:

- Analyze real estate markets and assess market trends.
- Make investment decisions based on economic feasibility analyses.
- Integrate sustainability criteria into investment strategies.
- Develop financing models for real estate projects.
- Conduct due diligence assessments and identify risk factors.
- Perform real estate valuations using recognized methods.

Personal Competence

Social Competence

Through group work and presentations, students develop collaboration skills and the ability to discuss complex investment topics. They also learn to conduct critical analyses and communicate their findings. Additionally, groups are composed of multicultural teams to enhance and refine students' intercultural interaction skills.

Methodological Competence

Students learn to apply theoretical concepts to practical case studies and justify investment decisions using both quantitative and qualitative methods.

Entrance Requirements

Successful completion of the following modules is recommended:

- BPP-01 Engineering Mathematics
- BPP-26 Commercial Management

Learning Content

- Fundamentals of the real estate sector (terminology, market mechanisms, market analysis, and investment concepts).
- Sustainability and climate change (impacts, sustainable building, life cycle cost analysis).
- Due diligence and site analysis (key evaluation criteria, risk assessment, decision-making fundamentals).
- Financing and time value of money (mortgages, cash flows, interest rate calculations).
- Valuation and investment methods (comparison, income, and cost approaches).
- Investment decision-making.
- Crisis and risk management (distressed assets, real estate classes, handling problematic properties).
- Future trends and digitalization (PropTech, new business models, market developments).
- Practical case studies and presentations (real-world examples, best practices, discussions).

Type of Examination

written ex. 90 min.

Methods

Lectures with case studies, PowerPoint presentations, whiteboard discussions, presentations, and simulations of investment decisions, group work, and discussions.

Recommended Literature

- Lecture scripts and materials.
- Jones, C. A., & Trevillion, E. (2022). Real Estate Investment: Theory and Practice. Palgrave Macmillan.
- Manganelli, B. (2015). Real Estate Investing. Springer.
- Khoja, A., Danylenko, O., Lopez, C. P., Davis, A., & Essig, N. (2021, October). Socioeconomic Reflections on Historic Buildings Renovations: A Portrait of Rural Alpine Municipalities. IOP Publishing.
- Khoja, A., & Danylenko, O. (2020). Real Estate 5.0: Synthesizing the Next Generation of Buildings. ON RESEARCH, 5, 50.
- Additional literature will be announced in the lecture.

Vernomimicry

Objectives

Qualification goals:

Vernomimicry explores the connection between nature and traditional building concepts as a response to climate change. Building on principles of biomimetic architecture and regional construction traditions, students learn to develop sustainable, climate-adaptive, and culturally embedded construction methods. The focus is not on the visual imitation of nature but rather on the functional integration of biological adaptation strategies into modern architectural concepts.

By analyzing historical building techniques, natural principles, and forward-looking architectural trends, students examine proven solutions that have adapted to local environmental conditions through evolutionary processes.

Through case studies, design methods, and their own projects, students develop innovative concepts for climate-resilient buildings and product that are not only sustainable but also deeply rooted in architectural culture and the environment. The goal is to understand nature and traditional arechitecture not just as an inspiration but as an integral part of the planning and construction process.

Professional Competence

Knowledge

Upon completion of the module, students will gain knowledge in:

- Materials and structures inspired by nature.
- Principles of desing in nature
- Principles of biomimetic architecture and traditional building methods.
- Biological and traditional construction strategies and their applicability to modern architecture.
- The relationship between climate adaptation, sustainability, and architecture.
- The integration of interdisciplinary insights from biology, architecture, and material science.
- Analytical skills for evaluating historical and modern architecture in the context of natural and traditional building principles.
- Understanding the interactions between nature and architecture.
- Creative thinking through critical reflection on existing construction methods and the development of innovative, vernomic solutions.

Skills

After successfully completing the module, students will be able to:

- Integrate biomimetic and traditional construction principles into architectural and product development concepts.

- Design climate-adapted and resilient building systems.
- Analyze historical and modern architecture in the context of natural and traditional building practices.
- Evaluate and optimize architectural designs using traditional and biomimetic approaches.
- Make informed, scientifically based decisions in selecting sustainable and resilient designs and material.

Personal Competence

Social Competence

Through group projects and interdisciplinary collaboration, students develop cooperative and communication skills. They work together to understand collaborative design processes that integrate both ecological and cultural considerations. Additionally, the groups are multicultural to enhance students intercultural interaction skills. This setting enables students to learn from one another and exchange knowledge about local building traditions and architectural characteristics from their home regions. As a result, they gain a deeper understanding of diverse traditional building techniques and their sustainable principles.

Methodological Competence

Students learn systematic methods for analyzing biomimetic principles and applying them to construction. They develop the ability to abstractly interpret natural processes and integrate them into sustainable architectural and urban design concepts. Furthermore, students apply theoretical knowledge in projects, demonstrating their ability to transfer their acquired skills to real-world applications.

Entrance Requirements

Learning Content

- Climate change and ecological challenges (global impacts on the construction industry and urban development, necessity of resilient building methods).
- Introduction to Vernomimicry and the evolution of architecture (connection between nature and architecture, historical development, future adaptation strategies).
- Design processes in nature and traditional architecture (comparison of natural processes and regional building methods, resilience, and material and form optimization).
- Learning from nature and tradition (analysis of biomimetic and traditional solutions, bio-utilization, biomorphism, biophilia).

- Traditional architecture and climate adaptation (regional building techniques, passive strategies, ecological materials).
- Comparison: Nature Tradition Modernity (similarities and differences, challenges of adaptation, cultural influences).
- Future trends in architecture (role of Vernomimicry, sustainable material development).
- Vernomimicry Practical case studies and presentations (project work, development of innovative, vernomic solutions, applications, discussions

Type of Examination

written ex. 90 min.

Methods

Lectures with interactive case studies, group work, interdisciplinary workshops, practical applications in design projects, and excursions.

Recommended Literature

- Khoja, A., & Waheeb, S. (2020). Vernomimicry: Bridging the Gap between Nature and Sustainable Architecture. Journal of Sustainable Development, 13(1).
- Pfammatter, U., & Hudson, J. (2014). Building for a Changing Culture and Climate: World Atlas of Sustainable Architecture. Dom.
- Weber, W., & Yannas, S. (Eds.). (2014). Lessons from Vernacular Architecture (Vol. 2). New York: Routledge.
- Knippers, J., Schmid, U., & Speck, T. (Eds.). (2019). Biomimetics for Architecture: Learning from Nature. Birkhäuser.
- Pohl, G., & Nachtigall, W. (2015). Biomimetics for Architecture & Design: Nature-Analogies-Technology. Springer.
- Farzaneh, H. H., & Lindemann, U. (2019). A Practical Guide to Bio-Inspired Design. Heidelberg: Springer Vieweg.
- Khoja, A. (2025). From Vernacular to Vernomimicry: Vernacular Design Principles for Resilient Communities. Springer.
- Sayigh, A. (Ed.). (2019). Sustainable Vernacular Architecture: How the Past Can Enrich the Future. Springer.
- Additional current publications and case studies will be announced in the course

Additional literature will be announced in the lecture

BPP-32 Compulsory Elective 1 (FWP-1)

Type of Examination

oral examination, report/presentation, written examination

BPP-33 Seminar on Product Development

Module code	BPP-33
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-33 Seminar on Product Development
Semester	6
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	report/presentation
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Qualification goals:

The project seminar Product Development is committed to the practice-oriented teaching concept of

of the BPP study programme by enabling students to consolidate the theoretical knowledge acquired in the modules focusing on building processes, as well as to test the further development of practical skills in the field of building product development. The project seminar is intended to give students the opportunity to put what they have learned from theory into practice while they are still in training.

Knowledge:

The project seminar provides the participants with knowledge about:

- Targeted application of theoretical knowledge in practice
- Principles, processes, and tools of project management

- Design thinking process for product development
- Design for X (DFX) approaches to product development
- Independent familiarisation with a new field of work

Skills:

Upon successful completion of the project seminar, students will be able to:

- Apply systematic approaches in practical work
- Manage a project or part of a project independently
- Present and communicate results of work verbally or digitally
- Document the course and results of the project in the form of a report

Competences:

After successful completion of the project seminar, students will have the competences to:

- Work in a task-oriented manner in small mixed groups, using different skills
- Prioritise tasks
- Escalate problematic issues
- Reflect on knowledge
- Share their own applications and sustainable ideas
- Structure, plan and execute tasks around a new project
- Be willing to compromise in teamwork
- Re-plan when problems cannot be solved

Applicability in this and other Programs

Construction Chemistry BPP-03

Building Material Characteristics BPP-11

Law 2 (EU Construction Product Regulations) BPP-22

Product Development and Tests BPP-24

Construction Material Tests BPP-25

Civil Engineering

Entrance Requirements

Successful completion of the following modules is recommended.

Modules 1 - 26

Learning Content

- Students work together in teams to develop new building products or optimise existing building products
- The team size varies (depending on the project) between 2 and 8 students
- A predefined task must be structured and executed

- The results must be presented and documented
- The task may consist of and/or combine content from the modules:
- BPP-11 Building Materials Science
- BPP-12 CAD 2D/ 3D (BIM)
- BPP-22 Law 2 (Building product law)
- BPP-23 Product Management 1 (International product strategy)
- BPP-24 Product Development/ testing 1
- BPP-25 Materials Testing

Teaching Methods

Lecture, exercises and examples, practice project

Remarks

Recommended Literature

Depending on the individual project

BPP-34 Bachelor Module

Module code	BPP-34
Module coordination	Prof. Markus Hainthaler
Course number and name	BPP-34A Bachelor Thesis BPP-34B Thesis Defense
Semester	7
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	0
ECTS	12
Workload	Time of attendance: 90 hours self-study: 270 hours Total: 360 hours
Type of Examination	bachelor thesis
Weighting of the grade	12/210
Language of Instruction	German

Module Objective

Expertise

Students will have the necessary knowledge of theories and methods to solve complex engineering issues in the field of construction products and processes

Students will be able to explain the relevant approaches and terminology in depth in one or several aspects of their subject

Students will be able to categorise a research task from their specialist field in context, describe it, and critically evaluate it

Students will be able to apply fundamental principles and methods for planning and structuring work in the project

Skills

Students will be able to independently handle complex academic questions

Students will be able to select, apply, and further develop methods where necessary that are appropriate for resolving the specialist problem at hand

Students will be able to analyse problems using the methods learned on the course, then arrive at informed decisions and develop solutions.

Students will be able to take a critical stance from a professional perspective regarding the results of their own research.

Students will be able to work on their own or in a team, to plan and structure their work, to communicate appropriately with partners, to present the issue that is being covered and to discuss the results that arose from the research.

Social skills

Students will be able to illustrate a scientific problem to an expert audience a precise, comprehensible and structured manner, both orally and in writing, in a specialist discussion whilst competently handling questions and answering them in a manner that is appropriate

Autonomy

Students will be able to apply academic work principles independently and fully so that the necessary knowledge and materials are acquired to handle an engineering problem or a research task

Students will be able to structure a wide-ranging task independently whilst also being able to handle it within a specified period of time

Students will be able to independently present their work and results in an academic style whilst using appropriate communication techniques

Applicability in this and other Programs

none

Entrance Requirements

Students who have earned at least 150 ETCS points may register for the bachelor's thesis.

Learning Content

During the course, students already learn several different communication and management techniques as well as the fundamentals of academic work. The bachelor module grants the opportunity to demonstrate acquired knowledge and skills when handling a larger engineering problem. Specific matters and problems are independently handled using academic research methods and then documented in a written bachelor?s thesis.

The bachelor?s thesis can be written in English or German.

After the bachelor?s thesis is successfully completed, the student should make an oral presentation about their bachelor project and its outcomes.

Teaching Methods

Independent work / seminars / individual and group project

Recommended Literature

- Eco U., Schick W., Wie man eine wissenschaftliche Abschlussarbeit schreibt, 13th edition, UTB 2010
- Ebel Hans Friedrich, Bliefert Claus, Bachelor-, Master- und Doktorarbeit, 4th edition, Wiley-VCH Verlag 2009
- Charles Lipson, How to Write a BA Thesis: A Practical Guide from Your First Ideas to Your Finished Paper, Chicago Press 2005

BPP-35 Product Management 2 (International Product Marketing)

Module code	BPP-35
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-35 Product Management 2 (International Product Marketing)
Semester	7
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	4
ECTS	5
Workload	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Type of Examination	Portfolio
Weighting of the grade	5/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- Marketing channels and marketing instruments
- Brand identity and brand image
- Methods and variables for product marketing
- Tools for international market and competitor analysis
- Computer-based tracking of market trends and target market analysis
- The phases of a construction product?s life cycle

Skills:

Upon successful completion of the sub-module, students will be able:

- To analyse industries and markets in order to market and maintain products in a demand-oriented manner
- To design/generate technical product documentation and advertising materials (from the printed medium to websites)
- To use in-house and external communication channels for product marketing in a targeted manner
- To set up foundations for online shops and web-based product configurations

Competences:

Upon successful completion of the sub-module, students will have competence in the following:

- Using the correct product with awareness of the entire product life cycle
- Bringing corporate objectives in harmony with the wishes of partners and customers with effective product marketing
- Increasing visibility and attractiveness of a product for potential customers with targeted product marketing
- Making note of the needs of national and international target groups using marketing methods to distinguish products from rival offerings

Applicability in this and other Programs

BPP-24 Product Development/ -testing

BPP-33 Seminar on Product Development

BPP-35 Product Management 1
BPP-36 Green Building

All similar courses in civil engineering

Entrance Requirements

Successful completion of the following modules is recommended.

BPP-23 Product Management 1

Learning Content

- Objectives of product marketing
- Approaches to strategy and development
- Outbound marketing and inbound marketing
- Consumer behaviour
- Phases of the product life cycle
- Technical product documents and advertising materials
- Product marketing variables

- Pricing, distribution and communications policy
- Brand identity
- Brand image

Teaching Methods

Lectures / Exercises / Tutorials / Homework
PowerPoint presentation, whiteboard, document camera (visualizer) and others
Lecture materials in iLearn

Recommended Literature

- Lecture script
- Produktmarketing, Entscheidungsgrundlagen für Produktmanager, Springer Verlag, ISBN: 978-3-540-67147-3
- Werner Pepels, Grundprinzipien des Produktmarketings.: 20 Bausteine zum professionellen Management von Produkten und Programmen, Drucker & Humblot,

BPP-36 Green Building

Module code	BPP-36
Module coordination	Prof. Dr. Ahmed Khoja
Course number and name	BPP-36 Green Building
Semester	7
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	5
ECTS	6
Workload	Time of attendance: 75 hours self-study: 105 hours Total: 180 hours
Type of Examination	Portfolio
Weighting of the grade	6/210
Language of Instruction	English

Module Objective

Knowledge:

The course provides the participants with knowledge about:

- Principles of sustainability
- Ecological, economic, and sociocultural aspects of sustainability.
- Essential criteria for sustainable construction
- National and international verification processes for organisational systems (e.g. environmental management systems), ecological products (e.g. cradle to cradle) and sustainable construction (e.g. DGNB, BNB, LEED).
- Instruments (ecological balance) and verification documents (environmental product declarations) that provide verified statements about the environmental impact of construction products.

Skills:

Upon successful completion of the sub-module, students will be able:

- To transfer possible approaches to sustainability based on case studies to construction products and buildings.
- To request, find, evaluate and select construction products in line with sustainable, ecological and recyclable principles.
- To provide the required evidence for construction products used in certified green buildings.

Competences:

Upon successful completion of the sub-module, students will be able:

- To recognise the fundamentals of the certification systems for organisations, buildings and products, to distinguish between them and to apply them correctly.
- To independently continue to promote sustainable, recyclable construction in practice.

Applicability in this and other Programs

BPP-23 Product Management 1

BPP-35 Product Management 2

BPP-26 Seminar on Project Management

BPP-33 Project Seminar Product Development

BPP-35 Product Management 2

All similar courses in civil engineering

Entrance Requirements

Learning Content

- Sustainability in construction
- Environmental and energy management systems
- Product labels
- Building certification systems
- Environmental accounting
- Environmental product declarations
- Cradle to cradle
- Recycling management

Teaching Methods

Lectures / exercises / tutorials / home work

PowerPoint presentation, whiteboard, document camera (visualiser) and additional lecture materials in iLearn

Recommended Literature

- Lecture script
- Extracts from the vhb course: Grundlagen Nachhaltigkeit (Basics of sustainability)
- Deutsche Gesellschaft für Nachhaltiges Bauen (German Sustainable Building Council), URL: https://www.dgnb.de DIN EN ISO 14001:2015 Environmental management systems - Requirements with guidance for use
- DIN EN ISO 14040 ("Environmental management - Lifecycle assessment - Principles and framework") DIN EN ISO 14044 ("Environment management - Lifecycle assessment ? Requirements and guidelines")
- DIN EN ISO 14025 (?Environmental labels and declarations - Type III Environmental declarations?)
- DIN EN 15804 (?Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products?)
- Cradle to cradle, URL: https://www.c2c.ngo

BPP-37 Compulsory Elective 2 (FWP-2)

Module code	BPP-37
Module coordination	Prof. Markus Hainthaler
Course number and name	Entrepreneurship Strategic Planning and Project Management Financing and Accounting Process Safety Life Cycle Analysis and Ecobalancing Technology and Intellectual Property Rights Management SIVV Certificate IFRS and Organizational Law Process Optimization Architectural History and Theory Interdisciplinary Product Development Innovative Constructions and Building Products Applied AI in the Building Process Real Estate Investment BPP-32 Compulsory Elective 1 (FWP-1)
Semester	6, 7
Duration of the module	2 semester
Module frequency	annually
Course type	compulsory course, required course
Level	Undergraduate
Semester periods per week (SWS)	60
ECTS	5
Workload	Time of attendance: 900 hours self-study: 1,350 hours Total: 2,250 hours
Type of Examination	oral examination, report/presentation, written examination

Weighting of the grade	5/210
Language of Instruction	English, German

Module Objective

The Compulsory Elective I and II modules provide the students with the opportunity to address specialized topics, other than the mandatory courses of the main field of study, topics that are broadening by that their field of knowledge and skills in these areas.

Several courses will be offered for each Compulsory Elective module upon availability and attendance interest of students from the following pool:

- Architectural History and Theory
- Entrepreneurship
- Strategic Planning and Project Management
- Finance and Accounting
- Workplace Innovation
- Management Systems according to ISO
- Health Safety Environment
- Technoligy and Intellectual Property Rights Management
- Energy and Ressource Efficiency
- Operational Processes

The module descriptions for the individual modules can be found in module 32 FWP-1.

Applicability in this and other Programs

BPP-34 Bachelor thesis

This module is primarily intended for the Bachelor of Building Products and Processes but it can also be chosen by students of other fields of study.

Entrance Requirements

Please see the respective course descriptions for specific information on prerequisites.

Learning Content

Please see the respective course descriptions for specific information on content.

Teaching Methods

Please see the respective course descriptions for specific information on didactic methods employed.

Recommended Literature

Please see the respective course descriptions for literature references.

Entrepreneurship

Objectives

Module objectives

The students should learn an efficient and goal-oriented entrepreneurship management. Efficient and goal-oriented entrepreneurship management makes it necessary to implement structured business processes and use up-to-date, demand-oriented start-up methodologies.
Entrepreneurial Management understands how to identify, analyze and seize opportunities, turn big/smart data into business opportunities and take full advantage of the digital transformation, manage stakeholders and communication, surf on diversity and do business in emerging markets, manage growth and understand the fundamentals of business rules.
The students learn a systematic process of envisioning a desired future, and translating this vision into broadly defined goals or objectives and a sequence of steps to achieve them.

Entrance Requirements

no

Learning Content

The module considers business start-ups as a process from the identification and evaluation of opportunities, the procurement of relevant human and monetary resources, the establishment of an organization, to the management of a start-up. In addition to theories and concepts, relevant practical methods to build a start-up team and procedures are taught to support this process.

Type of Examination

report/presentation

Methods

Seminaristic teaching / exercises / team work / home work

Recommended Literature

- Blank, S., The startup owner's manual: The step-by-step guide for building a great company . BookBaby, 2012
- Brown, T., Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation . Harper Collins, 2009
- Clark, T., Osterwalder, A., & Pigneur, Y.,. Business model you: a one-page method for reinventing your career . John Wiley & Sons, 2012
- Doz, Y. L., & Kosonen, M., Fast strategy: How strategic agility will help you stay ahead of the game . Pearson Education, 2008
- Drucker, P., Innovation and entrepreneurship . Routledge, 2014
- Maurya, A., Running lean: iterate from plan A to a plan that works . O? Reilly Media, Inc., 2012
- Osterwalder, A., & Pigneur, Y., Business model generation: a handbook for visionaries, game changers, and challengers . John Wiley & Sons, 2010
- Porter, M. E., & Advantage, C., Creating and Sustaining Superior Performance . New York, NY: Free press, 1985
- Ries, E., The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create RadicallySuccessful Businesses . Crown Publishing Group, 2011
- Wirtz, B. W. Business Model Management: Design - Instrumente - Erfolgsfaktoren von Geschäftsmodellen . Gabler Verlag, 2013
- Zollenkop, M., Geschäftsmodellinnovation: Initiierung eines systematischen Innovationsmanagements für Geschäftsmodelle auf Basis lebenszyklusorientierter Frühaufklärung . Springer-Verlag, 2009

Strategic Planning and Project Management

Objectives

Students will learn about the processes involved in planning and implementation of project in project management. Beginning with the process of building and leading project

team, to project management theory and steps, to finally looking at the implementation of successful project management, this course aims to provide a complete picture of project management in practice. Additionally, different types of project management will be compared, so that the students will be able to apply the most effective method, based on the type of project and/or team that they are dealing with. A special focus will be placed on the elements of planning, leadership and implementation.

Professional Competence

Knowledge

After successfully finishing the module, students should:

- Understand project management theory and its application
- Understand all the steps involved in project management, with a focus on planning
- Understand the different roles involved with project management
- Understand how project management teams work together or are put together in different environments
- Understand how to choose the correct type of project management method for different types of projects
- Understand what successful leadership in and of project management looks like
- Understand the challenges and typical project fails in planning and implementation of project management

Skills

Upon completion of the module the students will be able to:

- Transfer theoretical knowledge of project management real world projects
- Be able to determine which project planning management method is most effective in different situations
- Be able to determine which project management implementation method is most effective in different situations
- Be able to recognize the most effective leadership technique for various project teams
- Be able to recognize the signs when a project is not working or failing
- Be able to work on different projects in various environments

Personal Competence

Social competence

Students will work together on an in-class projects in small groups, in order to learn how to work efficiently with each other on solve problems and on implementing their knowledge together. This aims at enhancing their team-working skills as well as their problem-solving capabilities. Further, these groups are lined-up in a way to be mixed multi-cultural in order to foster and fine-tune students? intercultural interaction capabilities.

Methodological competence

The students will learn how to transfer theoretical knowledge into a project, and hence, will be able to apply their learned skills. This leads to greater retention of the learned theory, and enables transference skills. Further, the students will be provided with an overview of different sets of skills and theory, and will be able to choose the most efficient approach to applying these. Students will develop an analytical system-oriented way of thinking and should able to structure the most effective approach to project management from different aspects, beginning with planning, selection, to implementation.

Entrance Requirements

English skills

Learning Content

The course will be taught with a focus specifically planning, leadership and implementation:

- Project management theories
- Project management planning
- Project roles and stakeholders
- Project management theories
- Project management steps
- Project management leadership
- Project management teams
- Project management implementation
- Project management fails

Type of Examination

report/presentation

Methods

Interactive lecture, case studies, in class project, group work, discussions and presentations of work in progress.

Recommended Literature

Recommended reading (if possible in the most current edition):

- Berkun, S., Making Things Happen: Mastering Project Management (Theory in Practice). Sebastopol, CA: O'Reilly Media, 2008

- Edge, J., Agile: An Essential Guide to Agile Project Management, The Kanban Process and Lean Thinking + A Comprehensive Guide to Scrum . Luxemburg: CreateSpace Independent Publishing Platform, 2018
- Kunow, A., Project Management & Business Coaching: Agile project management - target-oriented and efficient with active body language & comprehensive communication . Buchum, Germany: KISP Bücher, 2019
- Martinelli, R.J., Milosevic, D.Z., Project Management ToolBox - Tools and Techniques for the Practicing Project Manager . Hoboken: Wiley, 2016
- Project Management Institute (Hrsg.) A guide to the project management body of knowledge. PMBOK(R) Guide . Newtown Square, PA: Project Management Institute, 2013
- Sutherland, J., Scrum: the art of doing twice the work in half the time . London: Random House Business Books, 2015
- Wysocki, R., Effective project management: traditional, agile, extreme . Indianapolis, IN: Wiley, 2014

Financing and Accounting

Objectives

Professional and methodological Competence
Students develop a thorough understanding of basic accounting principles, can classify the functions of investment and financing into the operational sequences and apply their instruments.

Knowledge

- Students know and understand the essential features of financial and management accounting as well as the legal foundations and components of bookkeeping and accounting.
- Students have a deep understanding of financial reports as a basic skill for business studies.
- Students are familiar with central methodological foundations and instruments of investment and financing, can explain them and apply them to typical operational problems.

Skills

- Students are able to evaluate the impact of business transactions on financial accounting. In particular, students have a deep understanding of the effectiveness/neutrality of business transactions on financial statements, and execute accounting transactions independently.
- Students are able to prepare and analyze financial statements and management reports.

- In their professional practice, students can identify problem situations that require investment and financing solutions. They are able to independently find adequate solutions for these situations, to evaluate them and to question them critically.

Personal Competence

Social competence

- Students develop communication skills that are supported by tasks and case studies. They are familiar with the essential terminology of financial accounting and communicate about basic problems with other participants using the appropriate technical terms.
- Students are encouraged to discuss critical/controversial topics in an objective atmosphere.
- Students can present their analyses in a goal-oriented and application-oriented manner matching the target audience.
- Students are able to work problem/solution-oriented in small mixed groups, learning and broadening teamwork abilities.

Autonomy

- Students will be able to solve complex problems independently with application-related, fundamental knowledge of bookkeeping and accounting.
- Students know and understand the limitations, assumptions and problems of methods and instruments of investment and financing in a specific context. Students can independently choose and employ suitable valuation approaches for the respective task.
- Students are able to relate their acquired knowledge to other lectures and topics.

Learning Content

1. Accounting: information for decision making
2. Basic financial statements
3. The accounting cycle
4. Understanding financial statements and cash flow
5. Time value of money
6. Valuing stocks and bonds
7. Capital Budgeting

Type of Examination

report/presentation

Methods

Seminaristic teaching combining topic-oriented lectures, exercises, group work, group presentations, and classroom discussions.
Students are encouraged to actively participate in course by choosing appropriate didactical methods. They are strongly invited to discuss real-life problems and applications interactively throughout the lecture.
The seminar is accompanied by tutorials where calculation examples from the course are repeated for better understanding and examples similar to those used during course sessions are calculated.

Recommended Literature

Basic literature

- Williams J.R., Haka S.F., Bettner M.S., Carcello J.V.; "Financial & Managerial Accounting: The Basis for Business Decisions"; 17th internat. edition; New York: McGraw-Hill Education; 2015.
- Ross S.A., Westerfield R.W., Jordan B.D.; "Essentials of Corporate Finance"; 9th internat. edition; New York: McGraw-Hill Education; 2017.

Supplementary literature

- McLaney E., Atrill P.; "Accounting and Finance: An Introduction"; 9th edition; Harlow: Pearson Education; 2018.
- Gitman L.J., Zutter C.J.; "Principles of Managerial Finance"; 14th global edition; Harlow: Pearson Education; 2015.

Process Safety

Objectives

Module Objective

The students understand the importance of process reliability, its key concepts and practical approaches needed to avoid potentially catastrophic incidents and to improve the efforts in managing process hazards. Upon completion of this module the students should have the following competences:

Professional Competence

Knowledge

- Students understand and explain why and how these process safety systems have been implemented in some certain way, what they are

intended to achieve, how to apply them daily to achieve safe and reliable operations, and possibly, how to improve them as needed.
- Students should know three essential parts of a process safety system that focus on general concepts of safety culture.
- They know safety pyramid with different levels and the way to define process risk. They are able to carry out a risk assessment considering the frequency and consequence.

- The students should identify different pictograms with specific hazard information. Students understand and explain typical barrier protection layer models.
- Operational disciplines should be well understood from both the organizational and personal point of view.
- The students are familiar with personal protective equipment and hazardous materials, as well as the fire explosion

Skills

- Ability to apply key concepts and methodologies to support effective process safety systems.
- Ability to transfer the knowledge to fill in potential gaps between the approaches presented in this course and the practices in facility.
- Ability to analyze the facilitys process safety program.

Personal Competence

Method competence:

After participating in this module, students will be able to understand safety culture and obey the safe guidelines in any working place. Based on the basic fundamental aspects of safety methodology, they can also meet and overcome the challenges that the safety

is needed to be further updated as the technology develops, e.g. further maintaining/ improving the facilitys process safety program.

Personal and social competence :

- Students should be able to let themselves complete work safely everyday.

- They have the personal communication skills to find the potential hazard not only from themselves but also from the coworkers, thus prevent the incidents in the first place.

- They reflect their disciplines to use safely the hazardous materials and process.

Entrance Requirements

Learning Content

- Introduction to Process Safety and its importance

- Safety Culture, Safety Permit Systems
- Process Safety Systems, Process Risk Assessement
- Protection Layer Model (Swiss Cheese Model, Bow Tie Diagrams)
- Operational Discipline (Organizational and Personal OD)
- Personal Protective Equipment
- Gases, Vapors, Particulates, Toxic Metals, Hazards of Liquids
- Hazardous Chemical Identification
- Fire and Explosion

Type of Examination

written ex. 90 min.

Methods

seminaristic teaching / exercises / case study / home work

Recommended Literature

James A. Klein, Bruce K.: Process Safety: Key Concepts and Practical Approaches. CRC Press Taylor & Francis Group, 2017.
Charles E. Thomas Process Technology: Safety, Health, and Environment. Cengage Learning, 3rd Edition, 2011
Kahl A., Bier M.: Arbeitssicherheit: Fachliche Grundlagen, Erich Schmidt Verlag, 2019

Life Cycle Analysis and Ecobalancing

Objectives

Module Objective

The students should understand and comply with the mandated safety and environment subjects, and apply the enforced site safety rules for the technicians.

Professional Competence

The students know and understand the various hazards in the processing and manufacturing industry as the enormous amount of knowledge and economics involved in an entire plant?s safety, health, and environmental (SHE) infrastructure and administration. Students can reveal and implement the SHE rules to protest people,

equipment, and potential profits form e.g. fires, explosion, and expensive litigation. The students are able to develop an intuitive understanding of safety culture.

Knowledge

Students are able to explain and reproduce the following basic theories, principles and practical applications:

- Understand the basic concepts of safety, with the focus on health and environment.
- Know where and how to find latest relevant knowledge, standards, regulations as well as research results.
- Use simple models to describe the different accident or incident scenarios
- Know the meanings of graphical symbols on hazard and warning signs.
- Understand and how to set priority of SHE concepts when dealing with the industrial process.

Skills

- Communication skill directly to safety engineers in a simple yet precise manner
- Ability to describe measures used to protect workers
- Ability to have creative thinking and development of the safety rules

Personal Competence

The students present and classify national and international standards and their enforcement and the student realizes there are severe penalties if a site fails to protect its workforce and surrounding community.

Social competence

The students are able to

- Express their arguments in a comprehensible way within a group in the field of safty technology.
- Reflect their knowledge, exchange their own applications and sustainable ideas

Autonomy

Students can

- Cover most government-mandated training and foundational aspects of apprentice technician safety training.
- Furthermore, they are able to evaluate and update these standards and rules.

Objectives explain what students know, understand, and can perform after completing the Module. The description should avoid repetition. For details see: Qualifikationsrahmen für Deutsche Hochschulabschlüsse and Handbook

Entrance Requirements

none

Learning Content

- Importance of process safety specifically for industries such as refining, petrochemicals, electric power generation, etc.
- Hazard Classification
- Routes of Entry & Environmental Effects
- Gases, Vapors, Particulates, & Toxic Metals
- Hazards of Liquids
- Fire and Explosion
- Respiratory Protection
- Electrical, Noise, Heat, Radiation, Ergonomic and Biological Hazards
- Personal Protective Equipment

Type of Examination

part of module exam, Portfolio

Methods

Seminaristic teaching / exercises / home work, document camera (visualizer) and additional lecture materials in iLearn.

Recommended Literature

- Speegle M., Safety Health and Environmental Concepts for the Process Industry, 2nd Edition, Delmar- Cengage Learning, New York, 2013
- Thomas, Charles E., Process Technology: Safety, Health, and Environment, 3rd Edition, Delmar- Cengage Learning, New York, 2012
- Deutsche Gesetzliche Unfallversicherung e.V. Machine Tool, Fire and Explosion Prevention and Protection , 2012

Technology and Intellectual Property Rights Management

Objectives

Professional Competence

Knowledge

- Understanding what intellectual property rights are
- Understanding the significance of intellectual property and technological Innovation in society
- Knowledge of basic principles and methods for intellectual property management
- Knowledge of basic principles n technology transfer
- Skills
- Students are able to apply theories and methods to :
- Identify intellectual assets
- Identify main types of intellectual property
- Prepare and evaluate an IP exploitation strategy
- Managing Intellectual property rights
- Technology transfer from University to Industry

Personal Competence

Social competence

- Students are able to work goal-oriented in small mixed groups, learning and broadening teamwork abilities.

Autonomy

- Develop analytical thinking, attention to details and ability to consider different strategies to solve individually problems related to this lecture.

Learning Content

- Introduction to Intellectual Property Rights
- Intellectual property rights management national and international environment
- World wide IPR management system, World Intellectual Property Organization (WIPO)
- International Treaties and Conventions on Intellectual Property
- The Impact of Technological Innovation on Society
- Protecting technical innovation: patents and trade secrets
- Intellectual property management in technology transfer

Type of Examination

report/presentation

Methods

Seminaristic teaching / exercises / team work / home work

Recommended Literature

- Melissa A. Schilling, Strategic management of technological innovation, 6th Ed., McGraw-Hill Education 2020
- Keith Goffin Palgrave, Innovation management : effective strategy and implementation, 3rd Ed., Macmillan Education 2017
- Intellectual Property Handbook: Policy, Law and Use, WIPO 2004 : https://www.wipo.int/about-ip/en/iprm/
- WIPO Technology Trends 2019 : https://www.wipo.int/publications/en/details.jsp?id=4386

SIVV Certificate

Objectives

The students should understand and apply the basic principles of the energy conversions, the technical aspects of energy and resource management. They will learn that the energy manager nowadays has many opportunities to reduce utility costs by using energy procurement strategies. With the focus on building, the students can understand and apply different energy and resources extensively with e.g. solar energy for heat and for electricity, geothermal energy, etc.

Entrance Requirements

basic mathematics and physics

Learning Content

Energy efficiency in gerneral

- Core concepts and basic points on resource and energy efficiency and management
- Basic calculations of energy efficiency for different power cycles
- Conventional fossil resources distributions, transport and utilization
- Efficiency and irreversible losses of apparatus and machinery drives: pumps, fans, blowers, compressors, heat exchangers, conveyors, indoor air quality
- Process analysis and optimization: energy benchmarks, heat integration, evaluation of alternative technology

Energy efficiency in the area of sustainable building

- technologies for the use of renewable energies

- Solar thermal energy for heat
- Solar panel (photovoltaic) for electricity
- Geothermal energy with heat pump
- Transmission heat losses
- etc.

Type of Examination

written ex. 90 min.

Methods

seminaristic teaching / exercises / tutorials / home work

Recommended Literature

- Yogi Goswami D.: Handbook of Energy Efficiency and Renew-able Energies, CRC Press, 2016
- Harvery, D., Energy and the New Reality 2: Carbon-Free Energy Supply, Eathscan, 2010
- Struchtrup, H., Thermodynamics and Energy Conversion, Springer, Heidelberg,2014,
- Demirel, Y., Energy: Production, Conversion, Storage, Conservation, and Coupling, 2016

IFRS and Organizational Law

Objectives

With focusing on organization, the students will be equipped with a thorough understanding by organization theory and together with management information systems.

Professional Competence

- Understand the principles of organizational arrangements
- Explain and demonstrate the organization structure, design, competitive strategies
- Assess the outside environments and how organizations can respond to them
- How to handle the operational information processing: fundamental management information systems concepts
- Applications of information systems in business practice

- Apply theoretical concepts to practical applications (case study)
- Understand the direct and indirect connection between information systems and business performance

Personal Competence

Methodological competence

The students will be able to use the organizational theory by knowing concepts, structures and strategies. Students are allowed to have in-depth look at how today's business firms use information technologies and systems to achieve corporate objectives.

Personal and social competences

- Students are able to develop analytical thinking, attention to details
- Students are able to consider and analyze different strategies to solve problems from the organization point of view
- Students are able to solve and discuss business problems in the field of information systems by applying systematic approaches and by identify alternative solutions in teams

Entrance Requirements

no prerequisites

Learning Content

- Nature of organizations and organization theory
- How strategies affect organization design
- Basic concepts of organization structure
- Major environmental forces on the organization
- Information systems in global business
- Information systems, organizations, and strategy
- IT infrastructure and emerging technologies
- Securing information systems

Type of Examination

written ex. 90 min.

Methods

seminaristic teaching / exercises / tutorials (case study) / home work

Recommended Literature

- Daft, R.L , Armstrong. A. . Organisation Theory and Design, Nelson Education, 2014
- Laudon K. C., Laudon J.P.,: Management Information Systems: Managing the Digital Firm, 13th Edition, Pearson, 2014.
- Schulz, O. Der SAP-Grundkurs für Einsteiger und Anwender, 2. Auflage, Galileo Press, 2013
- Eversheim, W., Organisation in der Produktionstechnik, Arbeitsvorbereitung, VDIVerlag, Düsseldorf
- Laux, H., Liermann, F.: Grundlagen der Organisation. Springer, 6. Aufl. Berlin 2005

Process Optimization

Objectives

Module Objective

Professional Competence

Knowledge

From the variety of engineering and management courses in the previous semesters, students are already capable to develop and design innovative building products for a wide range of applications. Another dimension for a successful and marketable building product lies both in ensuring its reliability and functionality during its whole lifetime, and the ability to manufacture this product efficiently, reproducibly and environment-friendly according to current quality standards on an industrial scale. This module therefore teaches the competences how to evaluate products according to their quality and reliability, and how to operate the respective production processes economically and optimize them holistically, with a special focus on sustainability and maximizing product quality while minimizing energy consumption. A wide range of optimization tools are presented that can be used in all phases of planning, operation and debottlenecking a plant.

Skills

After completing this module, students will be able to discuss all areas of quality optimizing a production plant both with technical and business experts. They understand the advantages and disadvantages of different optimization tools, their applicability limits and the required effort to realize them.

Personal and social Competence

The solution of the tasks given both in the lecture and the exam requires students´ self-responsible and self-directed working style. Herein, the concepts of all

module topics have to be applied to new problems, analyzed regarding their relevance, and evaluated in order to yield a reliable result.

Entrance Requirements

Learning Content

Quality Engineering

o Process-oriented quality management
o ISO 9000 ff.
o Set-up and introduction of a quality management system
o Methods and tools of quality planning
o Total Quality Management
o Six Sigma Process
o Define, Measure, Analyze, Improve, and Control (DMAIC-framework)
o Statistical methods within the DMAIC-framework

Production Optimization

o Reliability Management (FTA)
o Process Integration: Process Economics, Global Optimality, Heat Exchanger Networks (Pinch Method)
o Environmental Design: Aqueous Contamination, Atmospheric Emissions, Life Cycle Analysis (LCA)

Type of Examination

part of module exam, written ex. 90 min.

Methods

The lecture focuses on seminaristic teaching, but also applies detailed practical exercises based on the theoretical background. The key content is conveyed in combination of a written script and slide and video presentations. All material is uploaded to an online learning portal (iLearn). The students are strongly invited to discuss real-life problems and applications interactively throughout the lecture. Tutorials will be offered on demand.

Recommended Literature

Quality Engineering
o T. Pyzdek "Quality Engineering Handbook", CRC Press
o G. Linß "Qualitätsmanagement für Ingenieure", Hanser, München-Wien
o Pfeifer "Praxisbuch Qualitätsmanagement", Hanser, München-Wien
Production Optimization
o B. Bertsche "Reliability in Automotive and Mechanical Engineering", 1st edition
o R. Smith "Chemical Process Design and Integration", 2nd edition

Architectural History and Theory

Objectives

Students learn about the historic development of architecture worldwide. Furthermore, they understand architectural theories and its development over time.

Based on case studies, the students understand the concept of architecture as cultural expression of its specific period.

Professional Competence

Knowledge

After successfully finishing the module, students will get to:

- Understand the development of architecture in its historic context
- Understand the complexity of architectural solutions
- Understand vernacular architecture and its concepts in the context of different climate zones
- Understand representative architecture and its specific political and social context
- Understand the drivers behind the development of urban structures and its specific results

Skills

Upon completion of the module the students will be able to:

- Describe basic concepts of architectural development in different regions and in its specific political, social and environmental context
- Describe different architecture styles, with focus on Europe
- Describe basic concepts of the historic development of urban structures, including its political, social and environmental context

Social competence

Students are demonstrating working individually or in small groups to solve problems that aim at enhancing their team-working skills as well as their problem-solving capabilities. Further, students also know how to analyze the perspective of historic stakeholders, understand their behavior and understand the architectural outcome.

Methodological competence:

The students improve the knowledge in the field of history of architecture based on case studies. The students should be enabled to apply the acquired knowledge and to critically evaluate and inter-present subject-specific information on the basis of criteria of architecture. Students develop an analytical system-oriented way of thinking and are able to structure the approach for analyzing historic buildings and historic urban structures.

Entrance Requirements

None

Learning Content

- Human development, buildings, urban structures from the very start
- Historic development of architecture in Europe and selected examples from different continents
- Historic development of urban structures in Europe and selected examples from different continents
- Architecture theory and its application

Type of Examination

written ex. 90 min.

Methods

Seminaristic teaching / Presentations / Case studies / Moderated discussions / Field trips

Recommended Literature

Conway, H., Roenisch, R. (2004) Understanding Architecture - An Introduction to Architecture and Architectural History. Routledge : New York / USA

Interdisciplinary Product Development

Type of Examination

Portfolio

Innovative Constructions and Building Products

Type of Examination

part of module exam, report and presentation

Applied AI in the Building Process

Type of Examination

part of module exam, Portfolio

Real Estate Investment

Type of Examination

written ex. 90 min.

BPP-32 Compulsory Elective 1 (FWP-1)

Type of Examination

oral examination, report/presentation, written examination

BPP-38 English 2 (Negotiations)

Module code	BPP-38
Module coordination	Tanja Mertadana
Course number and name	BPP-38 English 2 (Negotiations)
Lecturer	Dozierende für AWP und Sprachen
Semester	7
Duration of the module	1 semester
Module frequency	annually
Course type	required course
Level	Undergraduate
Semester periods per week (SWS)	2
ECTS	2
Workload	Time of attendance: 30 hours self-study: 30 hours Total: 60 hours
Type of Examination	See examination schedule AWP and languages, written ex. 60 min.
Duration of Examination	60 min.
Weighting of the grade	2/210
Language of Instruction	English

Module Objective

The module English 2 (Negotiations) at level C1 aims to equip students with specialised language skills necessary for independent performance in a globalised field of building products and processes. The course focuses on negotiating terms and conditions with a variety of people from customers to suppliers as well as with government agencies and employees in the student's own company. The aim here is to deepen the students' relationship with the English language in a professional context so that they can use the language effectively and efficiently as a practical means of communication.

The module covers the four basic language skills - listening, reading, speaking and writing. Students expand their subject-specific vocabulary and deepen their knowledge of the language structures.

One aspect of the module is to optimise fluency and improve the ability to communicate in English in order to better understand texts and discussions. Through task-based speaking, listening, reading and writing activities, students improve their communicative skills and develop their ability to express themselves. This enables them to participate in technical discussions, to work in a team, to create relevant documents independently, and to successfully negotiate in English.

On completion of the module, the students will have achieved the following learning objectives:

Professional skills

- The students will be proficient in English at a confident language level (C1, CEFR) and will also be able to understand technical discussions in the field of building products and processes
- They will have the skills to understand specialised literature and to write texts independently at C1 level
- Students will have acquired the skills to express themselves at C1 level in formal and professional contexts
- They will be able to understand discussions and more complex content in their field of specialisation
- They will have developed the ability to functionally apply grammatical structures in their future professional fields
- Students will have the linguistic skill and flexibility to react competently to unexpected changes during a conversation

Methodological skills

- Students will have expanded their language acquisition skills by reflecting on their individual learning styles
- They will be able to filter information from different English sources and use it in a purposeful way during a negotiation
- Students will be able to represent their own position vis-à-vis another party in a negotiation
- Similarly, students will have learnt to respond to the negotiating partner at the right point in the discussion to ensure that agreement is reached without compromising their own position
- This course gives students the language skills they need to say the right thing at the right time

Social skills

- Students will have developed social skills such as teamwork, reliability, and negotiation skills

- Students will have learnt assertiveness in negotiations and how to deal respectfully with negotiating partners

Personal skills

- Students will have developed sound language skills and negotiating skills that are of fundamental importance for their personal development and the future work environment

Applicability in this and other Programs

No applicability in other degree programmes.

Entrance Requirements

Successful completion of the following modules is recommended.

The prerequisite for successful participation in the module is a command of the English language at B2/C1 level, based on the Common European Framework of Reference for Languages (CEFR).

Learning Content

1 What is a negotiation?
2 Goal setting and team preparation
3 Negotiating in different cultures
4 Writing tenders
5 Different types of persuasion and negotiation
6 Dealing with pressure
7 Listening carefully and reading between the lines
8 What does "fair" mean?
9 Short-term vs. long-term results
10 Different types of results
11 Follow-up and measurement of success
12 Paraphrasing and summarising skills
13 Idiomatic expressions

Teaching Methods

Teaching and learning methods focus on improving the four main language skills (listening, speaking, reading and writing) and optimising professional and soft skills. Examples of teaching methods used include various forms of group and individual work, mini-presentations, intensive reading and listening exercises, role-play and grammar

games, loci method, dictation exercises, translations, peer feedback, work with learning stations, and various writing activities to consolidate the knowledge gained.

Students will be given weekly assignments for self-study.

Remarks

All language courses require a compulsory attendance rate of 75% in order to be allowed to take the examination.

Recommended Literature

Baade, K., Holloway, C. et al *Business Result: 2nd ed.: Advanced* ., Oxford: OUP, 2018.

Brook-Hart, G. *Business Benchmark* . 2nd ed.: Advanced Cambridge:CUP, 2013.

Dubicka, I., O?Keeffe, M., *Market Leader Advanced.* Harlow: Pearson Longman, 2016.

Emmerson, P. *Business English Handbook Advanced* . London: Macmillian, 2007.

Hall, D., Foley, M. *MyGrammarLab Advanced (C1 /C2)* , Harlow: Pearson

LaFond, C., Vine, S., Welch, B *. Short Course Series - Englisch im Beruf - Business Skills ? B1/B2: English for Negotiating* , Berlin: Cornelsen, 2009.

Meyer, E. *The Culture Map: Decoding How People Think, Lead, and Get Things Done Across Cultures.* Public Affairs: New York, 2016.

Ury, W., Fischer, R. *Getting to Yes: Negotiating Agreement Without Giving In. Penguin: New York* , Third Edition, 2011.

Voss, C., Raz, T., *Never Split the Difference: Negotiating As If Your Life Depended On It* , Harper Business: London, 2017.