

# MODULE HANDBOOK

IIP@HBC

CLUSTER:  
DESIGNED SUSTAINABILITY

**HBC.**  
HOCHSCHULE  
BIBERACH  
UNIVERSITY  
OF APPLIED SCIENCES

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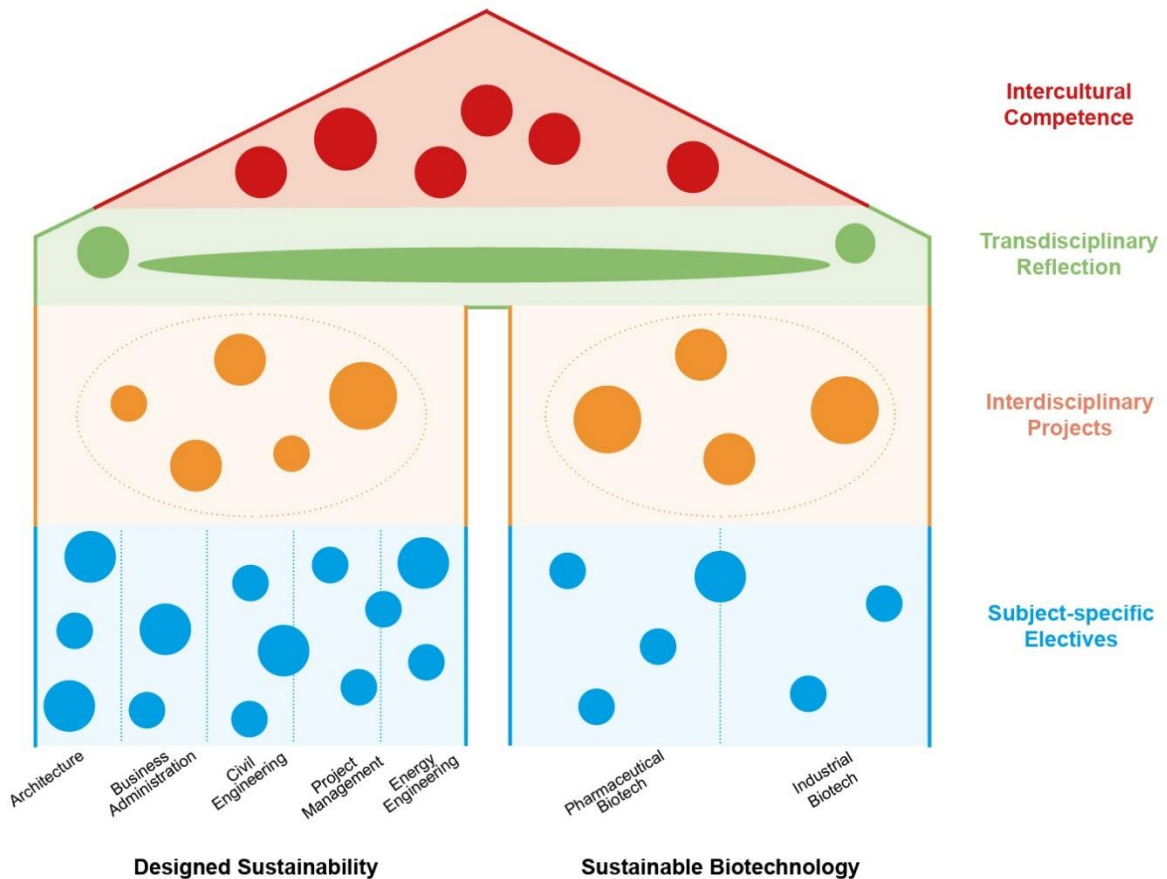
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## 1. IIP@HBC general program information

Students can choose up to 30 ECTS with a combination of intercultural competence courses, transdisciplinary reflections topics, interdisciplinary projects and subject-specific electives. The courses are offered on Bachelor level.



Graphic 1: Program Structure overview

Depending on students' focus at their home university it is possible to choose subject-specific (disciplinary) electives and interdisciplinary projects from **one** field of studies. We call those study areas Clusters. As of now, it is not possible to choose courses from several clusters.

Designed Sustainability contains subjects, which might be of interest for future Architects, Civil Engineers, Energy Engineers, Project Managers and Business Administrators.

Whereas the Cluster Sustainable Biotechnology offers courses for students in the field of Pharmaceutical and Industrial Biotechnology.

## 2. Cluster: Designed Sustainability

The focus lies on integrating sustainability into the design and planning of buildings. Students will work on subject-specific tasks in interdisciplinary projects. They acquire the skills to independently approach design tasks and to assess real, contradictory constraints in a subject-specific manner.

### 2.1 Course Overview

| Designed Sustainability   |           |                    |                    |                    |                    |                         |          |
|---|-----------|--------------------|--------------------|--------------------|--------------------|-------------------------|----------|
| Course title  | Mandatory | Architecture       | Energy Engineering | Civil Engineering  | Project Management | Business Administration | Semester |
| <b>Intercultural Competence</b>   |           | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>       |          |
| German language course for Incomings*   | X         | 2                  | 2                  | 2                  | 2                  | 2                       | WS / SS  |
| Intercultural Training for Incomings*   | X         | 1                  | 1                  | 1                  | 1                  | 1                       | WS / SS  |
| Mentoring Program for HBC students only                                       |           | 2                  | 2                  | 2                  | 2                  | 2                       | WS / SS  |
| Negotiation Skills and Work Cultures  |           | 2                  | 2                  | 2                  | 2                  | 2                       | WS / SS  |
| Intercultural Competence Training   |           | 1-2                | 1-2                | 1-2                | 1-2                | 1-2                     | WS / SS  |
| Spanish A1  |           | 2                  | 2                  | 2                  | 2                  | 2                       | WS / SS  |
| Spanish A2  |           | 2                  | 2                  | 2                  | 2                  | 2                       | WS / SS  |
| <b>Transdisciplinary Reflection</b>   |           | <b>1 ECTS</b>      | <b>1 ECTS</b>      | <b>1 ECTS</b>      | <b>1 ECTS</b>      | <b>1 ECTS</b>           |          |
| Transdisciplinary Activities  |           | 1                  | 1                  | 1                  | 1                  | 1                       | WS / SS  |
| <b>Interdisciplinary Projects</b>   |           | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>  | <b>min 3 ECTS</b>       |          |
| Interdisciplinary, Intercultural Teambuilding                                 |           | 2                  | 2                  | 2                  | 2                  | 2                       | WS / SS  |
| Design Studio 4 (Structural Design 1)   |           | 10                 |                    |                    |                    |                         | WS / SS  |
| Design Studio 5 (Structural Design 2)   |           | 10                 |                    |                    |                    |                         |          |
| Interdisciplinary Project Work  |           |                    | 10                 |                    |                    |                         | WS / SS  |
| Summer School 1   |           | 2                  | 2                  | 2                  | 2                  | 2                       | SS       |
| Summer School - Sustainable Methods in Construction                           |           | 2                  | 2                  | 2                  | 2                  | 2                       | WS       |
| <b>Disciplinary Electives</b>   |           | <b>min. 3 ECTS</b> | <b>min 3 ECTS</b>  | <b>min. 3 ECTS</b> | <b>min. 3 ECTS</b> | <b>min. 3 ECTS</b>      |          |
| International Workshop (different topics) (5 ECTS for each topic)             |           | 5-15               |                    |                    |                    |                         | WS / SS  |
| English Bachelor Thesis (Energy Engineering)                                  |           |                    | 12 + 2             |                    |                    |                         | WS / SS  |
| Summer School by Energy Engineering (Block seminar in May)                    |           |                    | 2                  |                    |                    |                         | SS       |
| "Applied Experimental Design and Statistical Analysis"                        |           |                    |                    |                    |                    |                         |          |
| Summer School by Energy Engineering   |           |                    | 2                  |                    |                    |                         | SS       |
| "Photovoltaic and Electrical System Design in Buildings"                      |           |                    |                    |                    |                    |                         |          |
| Introduction to Lighting  |           |                    | 2                  |                    |                    |                         | WS       |
| Building Communication Systems  |           |                    | 2                  |                    |                    |                         | WS       |
| Project work Construction Engineering   |           |                    |                    | 2                  |                    |                         | WS / SS  |
| Project work Urban Water Management   |           |                    |                    | 2                  |                    |                         |          |
| Intercultural Cooperation in Civil Engineering                                |           |                    |                    | 1                  |                    |                         | WS / SS  |
| English Bachelor Thesis (Civil Engineering)                                   |           |                    |                    | 10 + 2             |                    |                         | WS / SS  |
| Subject English 1   |           |                    |                    |                    | 2 + 2              |                         | WS / SS  |
| Visualization and Presentation  |           |                    |                    |                    | 2                  |                         | WS / SS  |
| Project management fundamentals   |           |                    |                    |                    | 2                  |                         | WS/SS    |
| Introduction to Construction Management                                       |           |                    |                    |                    | 2                  |                         | WS / SS  |
| Construction process engineering (Bauverfahrenstechnik)                       |           |                    |                    |                    | 2                  |                         | WS / SS  |
| Engineering project with BIM 1  |           |                    |                    |                    | 3                  |                         | WS / SS  |
| Road planning and design  |           |                    |                    |                    | 3                  |                         | WS / SS  |
| Road construction and equipment   |           |                    |                    |                    | 2                  |                         | WS / SS  |
| International Contract Management   |           |                    |                    |                    | 2                  |                         | WS / SS  |
| Project Work 1  |           |                    |                    |                    | 7                  |                         | WS / SS  |
| English Bachelor Thesis (Project Management)                                  |           |                    |                    |                    | 12                 |                         | WS / SS  |
| Business English  |           |                    |                    |                    |                    | 3                       | WS / SS  |
| Business Models along the Energy Value Chain                                  |           |                    |                    |                    |                    | 2                       | WS / SS  |
| Energy Consumption & Climate Protection Pathways                              |           |                    |                    |                    |                    | 3                       | WS / SS  |
| Entrepreneurship (Design Thinking / Strategic Management / Business Planning) |           |                    |                    |                    |                    | 8                       | WS / SS  |
| English Thesis (Business Administration)                                      |           |                    |                    |                    |                    | 12                      | WS / SS  |

## 2.2 Intercultural Competence

Various formats of activities are offered to develop students' intercultural competence, in which the students can deal with intercultural aspects, questions of global and peaceful coexistence and also with cultural, ethical and social topics.

### 2.2.1 German Language Course (IO\_DK)

\* This course is compulsory of international Incoming students

|  |   |
|--|---|
| Credits (ECTS)   | 2 ECTS  |
| Lecture hours (SWS)  | 2 SWS   |
| Prerequisite   | An entry test will be offered to assign participants to the appropriate course level.   |
| Semester (Summer/Winter/Both)  | Both  |
| Lecturer   |   |
| Objectives (Learning Outcome)  | Introduction and extension of vocabulary.<br>Increase of understanding of German culture  |
| Lecture topics (content)   | Explanation and illustration of German grammar, everyday vocabulary, study specific situations and intercultural differences  |
| Teaching format (e.g. online / in person lecture / Seminar / Lab etc.) | It takes place in two groups: Beginners and Advanced (B1).<br>In person lecture and online sessions.<br>After a one-week intensive course, the German course continues during the semester. |
| Examination  | ECTS will be achieved with <u>mandatory</u> attendance.   |
| Literature list  | Depending on level  |

## 2.2.2 Intercultural Training (IO\_ITI)

\* This course is compulsory of international Incoming students

|   |  |
|---|--|
| Credits (ECTS)  | 1 ECTS   |
| Lecture hours (SWS)   | 1 SWS (2 days during the Orientation Week)   |
| Prerequisite  | No prerequisite  |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Tanja Böttcher (Dipl Psych)  |
| Objectives<br>(Learning Outcome)  | Increase Intercultural competence of participating Students  |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Explain and illustrate the concept of „culture“</li> <li>▪ Find and compare strategies to improve intercultural competence</li> <li>▪ Discuss the term „Typical German“ and its components</li> </ul> |
| Teaching format<br>(e.g. online / in person<br>lecture / Seminar / Lab<br>etc.) | Interactive seminar  |
| Examination   | ECTS will be achieved with <u>mandatory</u> attendance.  |
| Literature list   | worksheets   |

### 2.2.3 Mentoring program

\* This course is for HBC students only

|                               |  |
|-------------------------------|--|
| Credits (ECTS)                | 2 ECTS   |
| Lecture hours (SWS)           | Individual workload  |
| Prerequisite                  | <ul style="list-style-type: none"> <li>• Recommended: successfully absolved semester abroad at a partner university,</li> <li>• curiosity, organization, efficiency, responsibility, and engagement;</li> <li>• Presence in Biberach one week before the official start of the semester (Orientation week)</li> </ul>  |
| Semester (Summer/Winter/Both) | Both   |
| Lecturer                      | N/A  |
| Objectives (Learning Outcome) | <ul style="list-style-type: none"> <li>▪ Creation of an international network by meeting students from all over the world: Europe, Asia, North and South America etc.</li> <li>▪ Gain knowledge about foreign cultures and lifestyles</li> <li>▪ Improvement of foreign language skills</li> <li>▪ Increase intercultural experience and competence</li> <li>▪ Help for Incoming students ease into their new study environment and make them feel welcome in Biberach</li> <li>▪ Connection of HBC students (mentors) and incoming students (mentees)</li> <li>▪ Assurance of integration of incoming students</li> </ul>   |
| Lecture topics (content)      | <ul style="list-style-type: none"> <li>▪ get in contact with the mentee via email before he/she arrives</li> <li>▪ if necessary support the mentee in finding a suitable housing</li> <li>▪ if necessary help the mentee to organise the journey from the airport to Biberach</li> <li>▪ pick up the key from the students' dorm before the mentee's arrival in Biberach</li> <li>▪ be on hand to pick up the mentee from the train station and bring her/him home</li> <li>▪ join the welcoming activities as well as the semester program organized by HBC's international office</li> <li>▪ provide general help with getting settled in Biberach and make her/him feel at home and familiarize her/him with: the public transport system, where to go out, where to meet the local students, where to go shopping (town, shops, farmer's markets, supermarkets ... ), where to find a doctor, where to get a SIM card, ... and answer any questions that might pop up</li> <li>▪ help the mentee with the first orientation around HBC and its university life: where do you find important</li> </ul> |



|   |  |
|---|--|
|   | <p>places like the library, cafeteria/canteen, university sports, the international office, class schedules, how to download scripts, how to charge a copy card ...</p> <ul style="list-style-type: none"> <li>▪ be on hand during semester activities: international regulars' table, excursions, BBQ's ...</li> <li>▪ keep in touch with your mentee throughout the whole semester not just via e-mail or facebook, but by meeting in the flesh</li> </ul> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Individual meetings and events   |
| Examination   | Not required   |
| Literature list   | N/A  |

## 2.2.4 Negotiation and Work Culture – Studium Generale

|   |   |
|---|---|
| Credits (ECTS)  | 2 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  | English skills at least B2  |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Lyn Fish  |
| Lecture topics<br>(content)   | <p>A negotiation is a strategic discussion that resolves an issue in a way that both parties find acceptable. In a negotiation, each party tries to persuade the other to agree with his or her point of view. How are negotiations conducted with Germans? What should be taken into consideration to prepare English-speakers for entering into negotiations with Germans.</p> <p>Doing business in Germany, as well as getting to grips with the business culture in Germany, can be a challenge for newcomers. This is especially true if your place of work isn't an international company or a tech start-up.</p> <p>Whilst the English-speaking world shares many social and cultural similarities, German work culture is definitely an area which is substantially different and we will examine these differences to prepare us for working in Germany.</p> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | In person lecture   |
| Examination   | tba   |
| Literature list   | N/A   |

## 2.2.5 Intercultural Competence Training - Studium Generale

|   |   |
|---|---|
| Credits (ECTS)  | 1 ECTS<br>(2 ECTS for HBC Bachelor International Students)  |
| Lecture hours (SWS)   | 2 full-day appointments during the Semester   |
| Prerequisite  |   |
| Semester<br>(Summer/Winter/Both)  | Winter  |
| Lecturer  | Mrs. Westenhoefer,<br>Mr. Goth  |
| Objectives<br>(Learning Outcome)  | The students can recognize their own world view and perceive and accept cultural differences and similarities. Cultural differences, cultural dimensions, cultures are recognized and understood (concepts based on Geert Hofstede and Erin Meyer/Harvard, among others). The students get an overview of the essential aspects of intercultural competence, they perceive, reflect and understand themselves in the intercultural space. Dealing with stereotypes is learned and intercultural sensitivity and competence are developed. Students can deal with their own culture shock and reflect on existing intercultural encounters |
| Lecture topics<br>(content)   | Constructivism<br>Concepts for measuring & recognizing cultural characteristics and differences (culture onion and cultural dimensions according to Hofstede, Sinus milieu)<br>Culture shock<br>Stereotypes & prejudices<br>Characteristics of intercultural competence<br>Preparation for one's own abroad   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Interactive Seminar   |
| Examination   | Active participation and at least 75% attendance<br>(For Bachelor international students, the examination performance is determined by the lecturers at the beginning of the semester)  |
| Literature list   | N / A   |

2.2.6 Spanish A1 – Studium Generale  
(German title: Spanisch A1)

|                                  |  |
|----------------------------------|--|
| Credits (ECTS)                   | 2 ECTS   |
| Lecture hours (SWS)              | 2 SWS  |
| Prerequisite                     | None   |
| Semester<br>(Summer/Winter/Both) | Both   |
| Lecturer                         | Mrs. Vera Sproll   |
| Objectives<br>(Learning Outcome) | Teaching the Spanish language and culture in Spanish-speaking countries  |
| Lecture topics<br>(content)      | <p>Chapters 1 to 8 in textbook <i>Perspectivas !Ya! A1</i></p> <p><b>Chapter 1</b><br/>Greeting, name and origin, verb <i>ser</i>, negation, alphabet, pronunciation and intonation, numbers 0 to 10</p> <p><b>Chapter 2</b><br/>Saying goodbye, asking how you are, introducing someone, ordering something in a restaurant / bar, verb <i>estar</i>, nouns in the singular and plural, the article, regular verbs on -ar and -er, numbers from 11 to 20</p> <p>Chapter 3<br/>Giving your profession and place of work, asking what something is called in Spanish, giving your place of residence, street and telephone number, regular verbs ending in -ir, verb <i>tener</i>, numbers from 21 to 100</p> <p>Chapter 4<br/>wishing someone a happy birthday, naming family members, giving a date, describing someone, possessive companions, adjectives, verb <i>conocer</i></p> <p>Chapter 5<br/>talking about everyday life, days of the week and times of day, frequencies, verb <i>creer</i>, giving reasons for something, verbs with 1st person singular on -go, verb <i>ir</i></p> <p>Chapter 6<br/>Describing a place or city, use of <i>ser</i> and <i>estar</i>, use of <i>hay</i>, cardinal points, indefinite adjectives, numbers from 100 upwards</p> <p>Chapter 7<br/>Talking about accommodation, expressing preferences, booking a hotel room, complaining about something, verbs with stem vowel changes, <i>se</i> + verb in the 3rd person</p> <p>Chapter 8<br/>talking about means of transport, giving places and directions, asking for directions, <i>tener</i> + <i>que</i> + infinitive, verbs with stem changes, subordinate clauses with <i>para</i> + infinitive, subordinate clauses with <i>ir a</i> + infinitive, demonstrative pronouns and companions</p> |
| Teaching format                  | In person  |

|  |                          |
|--|--------------------------|
| (e.g. online / in person lecture / Seminar / Lab etc.) |                          |
| Examination  | Essay + oral examination |
| Literature list  | Perspectivas !Ya! A1     |

2.2.7 Spanish A2 – Studium Generale  
(German title: Spanisch A2)

|   |                          |
|---|--------------------------|
| Credits (ECTS)  | 2 ECTS                   |
| Lecture hours (SWS)   | 2 SWS                    |
| Prerequisite  | Spanish A1               |
| Semester<br>(Summer/Winter/Both)  | Both                     |
| Lecturer  | Mrs. Paloma Bernal Munoz |
| Objectives<br>(Learning Outcome)  |                          |
| Lecture topics<br>(content)   | Spanisch A2              |
| Teaching format<br>(e.g. online / in person<br>lecture / Seminar / Lab<br>etc.) | In person                |
| Examination   | Written presentation     |
| Literature list   | N / A                    |

## 2.3 Transdisciplinary Reflection

In addition to the disciplinary and interdisciplinary cluster elements, the transdisciplinary aspect is another component of the respective cluster. The aim of the reflection module is for the participants in the individual clusters to enter into a dialogue on current and not necessarily technical topics.

### 2.3.1 Transdisciplinary Activities (IO\_TA)

|                               |   |
|-------------------------------|---|
| Credits (ECTS)                | 1   |
| Lecture hours (SWS)           | Individual  |
| Prerequisite                  | Participation in at least three events  |
| Semester (Summer/Winter/Both) | Both  |
| Lecturer                      | Organizer: International Office   |
| Objectives (Learning Outcome) | <ul style="list-style-type: none"> <li>▪ Strengthen the students' connection / network with the industrial partners in the region.</li> <li>▪ Giving an insight into German companies and their international productions.</li> <li>▪ Introducing the German culture to international students</li> <li>▪ Visit and introduce regional sights and cities to international students</li> <li>▪ Experience Biberach and its surrounding with all senses</li> <li>▪ Improvement of intercultural and international competence</li> </ul>   |
| Lecture topics (content)      | <ul style="list-style-type: none"> <li>▪ <b>Company visits:</b> Participants will get the possibility to visit local companies, such as LIEBHERR GmbH, Boehringer Ingelheim or BAUFRITZ and get first-hand insight and information on their production plants.</li> <li>▪ <b>Cultural Trips:</b> Both Incoming and regular HBC students visit cultural highlights in the South of Germany, for example a local Christmas Market in the winter semester or Schloss Neuschwanstein in the summer semester.</li> <li>▪ <b>Social Activities:</b> Social Activities take place on HBC Campus and around Biberach City. They are mostly open for the whole HBC community and include activities such as international food-tasting on Campus, Clean-Up Walks around town, Debating Events on sustainability topics etc.</li> </ul> <p>A catalogue with an overview of Events, Trips and company visits planned for the current/upcoming semester will be created and provided by the International Office.</p> |

|   |  |
|---|--|
| Teaching format<br>(e.g. online / in person<br>lecture / Seminar / Lab<br>etc.) | Excursions to companies; Activities on Campus or in the<br>surrounding area  |
| Examination   | 1-2 pages report about the chosen fieldtrip / social activity<br>needs to be handed in via email to the International Office |



## 2.4 Interdisciplinary Projects / Courses

### 2.4.1 Interdisciplinary and Intercultural Teambuilding

|                               |  |
|-------------------------------|--|
| Credits (ECTS)                | 2  |
| Lecture hours (SWS)           | 2 SWS  |
| Prerequisite                  | No Prerequisite  |
| Semester (Summer/Winter/Both) | Both   |
| Lecturer                      | Dipl. Psych.Tanja Böttcher<br>Prof. Dr. Alexander Floß   |
| Objectives (Learning Outcome) | <ul style="list-style-type: none"> <li>▪ Interdisciplinary training</li> <li>▪ Improvement of team skills</li> <li>▪ Increasing intercultural competence</li> <li>▪ Optimization of presentation skills</li> <li>▪ Improvement of English language skills</li> </ul>   |
| Lecture topics (content)      | <p>The course includes two essential elements:</p> <p>1. Interdisciplinary Component:</p> <p>Prof. Floß will give a keynote speech on "Thermal Energy Supply of Tomorrow Against the Background of Climate Change" at the kick-off event. The participants will then be divided into interdisciplinary and intercultural groups, each of which will work independently on one of the following topics over the next six weeks:</p> <ul style="list-style-type: none"> <li>▪ CO2-Emission of Mobility</li> <li>▪ CO2-Emission by Digitalisation</li> <li>▪ CO2-Saving by Thermal Insulation of Buildings</li> <li>▪ The Honest CO2 Balance of Wood</li> </ul> <p>Prof. Floß will offer weekly consultations, which must be attended at least 3 times to enable the processing and evaluation of the project.</p> <p>2. Intercultural and Team-building Component:</p> <p>In addition, practical team-building measures are taught and will be taught and implemented during the kick-off and the second face-to-face event to help students find their way in their respective working groups with regard to the different professional and cultural backgrounds.</p> <p>Content-wise, the focus will be on constructive cooperation in intercultural &amp; interdisciplinary teams and on acquiring experiences and skills that are enormously helpful for leading such teams in</p> |

|   |  |
|---|--|
|   | <p>later professional life.</p> <p>The effects and implementation of these team-building measures within this course will be evaluated and reflected upon after consultation (online).</p>   |
| <p>Teaching format<br/>(e.g. online / in person<br/>lecture / Seminar / Lab<br/>etc.)</p> | <p>Total duration: approx. 6 weeks</p> <ol style="list-style-type: none"> <li>1. kick-off meeting at the beginning of the semester (March 21)</li> <li>2. weekly opportunity for consultation to clarify technical questions with Prof. Floß (must be attended at least 3 times)</li> <li>3. Feedback sessions with Tanja Böttcher for reflection on the team-building process, to be scheduled as needed</li> <li>4. teambuilding event (April 18)</li> <li>5. final presentation of the academic work (end of April/beginning of May)</li> </ol> |
| <p>Examination</p>  | <p>Project presentation and report (max. 10 pages):</p> <p>As part of the final event, both the result of the project work is presented and detailed feedback on the team work is given.</p>   |
| <p>Literature list</p>  | <p>To be provided</p>  |

2.4.2 Design Studio 4 (Structural Design 1) – Architecture  
(German title: Konstruktiver Entwurf 1 /Studio 4)

|   |   |
|---|---|
| Credits (ECTS)  | 10 ECTS   |
| Lecture hours (SWS)   | 6 SWS   |
| Prerequisite  | 3rd year students   |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Depending on semester:<br>Prof. Wolfgang Brune / Prof. Benedikt Bosch / Prof. Rainer Weitschies   |
| Objectives<br>(Learning Outcome)  | The integrated project includes the realistic processing of a project from concept to implementation planning, including other disciplines. |
| Lecture topics<br>(content)   | Independent processing of a project in a team with defined interim presentations and a final presentation.                                  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Project study, corrections, presentations.  |
| Examination   | Project work  |
| Literature list   | Project related technical literature and planning documents.  |

2.4.3 Design Studio 5 (Structural Design 2) – Architecture  
(German title: Konstruktiver Entwurf 2 /Studio 5)

|   |   |
|---|---|
| Credits (ECTS)  | 10 ECTS   |
| Lecture hours (SWS)   | 6 SWS   |
| Prerequisite  | Design Studio 4 (Structural Design 1)   |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Depending on semester:<br><br>Prof. Rainer Weitschies/ Prof. Benedikt Bosch   |
| Objectives<br>(Learning Outcome)  | The integrated project includes the realistic processing of a project from concept to implementation planning, including other disciplines. |
| Lecture topics<br>(content)   | Independent processing of a project in a team with defined interim presentations and a final presentation.                                  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Project study, corrections, presentations.  |
| Examination   | Project work  |
| Literature list   | Project related technical literature and planning documents.  |

2.4.4 Interdisciplinary Project Work – Energy Engineering  
(German title: Projektarbeit oder Fach aus anderen Studiengängen)

|   |   |
|---|---|
| Credits (ECTS)  | 10 ECTS   |
| Lecture hours (SWS)   | 1 SWS   |
| Prerequisite  | Sufficient knowledge in Energy Engineering  |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Topic specific  |
| Objectives<br>(Learning Outcome)  | The students learn to use their previously acquired skills in a project of medium to high complexity that is new to them. Precise technical communication and mutual provision of information (group work), independent handling of specialist topics and their analysis, as well as technical development, written, and oral presentation of the results.<br>Real projects in building and energy technology require technical competence and interdisciplinary foresight. Against this background, an understanding of other disciplines is essential.  |
| Lecture topics<br>(content)   | The project contents may come from any area of the energy systems and building climate / technical building services and are usually integrated planning tasks going into detail in the various disciplines such as energy generation and supply, building physics, electrical and automation technology, thermal energy systems all the way to the field of lighting technology and energy management systems. The contents of the lectures of the economics and project planning and implementation modules should be applied.<br>All projects have great practical relevance; numerous projects are carried out in cooperation with partners from industry, municipalities, or engineering/architecture firms. |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Project   |
| Examination   | Project work  |
| Literature list   | Topic specific literature   |

*\*student can choose to take either the Project work or Bachelor Thesis*

2.4.5 Summer School 1  
(BB6.10-23)

|   |  |
|---|--|
| Credits (ECTS)  | 2 Credits  |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  |  |
| Semester<br>(Summer/Winter/Both)  | Summer semester  |
| Lecturer  | Prof. Dr.-Ing. Matthias Bahr<br>Prof. Dr.-Ing. Gerhard Haimerl<br>Adjunct Lecturers  |
| Objectives<br>(Learning Outcome)  | <ol style="list-style-type: none"> <li>1. Recognize the importance and roles of BIM</li> <li>2. Define benefits of BIM terminology</li> <li>3. Analyze BIM solutions to resolve common problems of construction projects</li> <li>4. Relationship between scheduling, estimating and BIM (4D &amp; 5D Virtual Design)</li> <li>5. Learn various BIM software and technology to apply those to real-life construction projects.</li> <li>6. Working on practical projects in international groups</li> </ol>        |
| Lecture topics<br>(content)   | <p>Fundamental principles of digital methods in construction such as:</p> <ol style="list-style-type: none"> <li>1) Building Information Modeling (BIM)</li> <li>2) Construction sequence studies</li> <li>3) Clash detection between different disciplines</li> <li>4) Automated cost estimating by extracting material data from a 3-D BIM model</li> <li>5) 4D Construction Scheduling Simulation.</li> </ol> <p>Both topics are worked on in international groups with students from partner universities.</p> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lectures, seminars<br>Project processing in individual and group work<br>At Hochschule Biberach and within international online lectures   |
| Examination   | Project Presentation   |
| Literature list   |  |

2.4.6 Summer School - Sustainable Methods in Construction  
(BB6.10-24)

|   |   |
|---|---|
| Credits (ECTS)  | 2 Credits   |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  |   |
| Semester<br>(Summer/Winter/Both)  | Winter semester   |
| Lecturer  | Prof. Dr.-Ing. Gerhard Haimerl<br>Prof. Dr.-Ing. Matthias Bahr<br>Adjunct Lecturers   |
| Objectives<br>(Learning Outcome)  | <ol style="list-style-type: none"> <li>1. Define key terms of sustainability</li> <li>2. Identify and apply green building assessment tools to evaluate the sustainability of a building</li> <li>3. Interpret green building requirements related to the site, water, air quality, energy consumption and materials and resources</li> <li>4. Evaluate first cost versus life cycle cost for sustainable construction materials and methods</li> <li>5. Interpret current thinking about Sustainable Development and Sustainable Construction in the economic sector known as the Built Environment</li> <li>6. Understand worldwide efforts in Sustainable Development and Sustainable Construction.</li> <li>7. Working on practical projects in international groups</li> </ol> |
| Lecture topics<br>(content)   | <p>This course covers the basic concepts of sustainability in construction, through the study of contemporary sustainable construction methods and best practices. The course will address site management and land use, sustainable water engineering, indoor environmental quality, and basics of life-cycle-cost assessment. Emphasis is placed on the use of U.S. Green Building Council's Leadership in Energy and Environmental Design standards to evaluate alternatives and select techniques for constructing sustainable projects.</p> <p>The topics are worked on in international groups with students from partner universities.</p>   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | <p>Lectures, seminars</p> <p>Project processing in individual and group work</p> <p>At Partner universities and within international online lectures</p>  |
| Examination   | Project Presentation  |
| Literature list   |   |

## 2.5 Disciplinary Electives

### 2.5.1 International Workshops - Architecture

|                               |   |
|-------------------------------|---|
| Credits (ECTS)                | 5 ECTS for each workshop topic (there will be 2-3 workshops available)  |
| Lecture hours (SWS)           | 4 SWS   |
| Prerequisite                  | 3rd year students   |
| Semester (Summer/Winter/Both) | Both  |
| Lecturer                      | Depending on topics   |
| Objectives (Learning Outcome) | <p>The architecture department offers workshops on different topics addressing the current development and challenges of city planning.</p> <p>The workshop attempts to learn the strategies discussed in practical application and to reflect on them critically.</p>  |
| Lecture topics (content)      | <p>Potential topics of the workshops:</p> <ul style="list-style-type: none"> <li>▪ Mobility as urban factors</li> </ul> <p>The workshop focuses on the theme of mobility and public space, analysing contradictory elements, at times difficult to reconcile, linked to changing urban dynamics, also in relation to the environmental crisis we are going through.</p> <p>The program foresees, through 5 macro themes, to analyze the theme of mobility by talking about: people and how they move, urban mobility policies, infrastructures and their central role in the regeneration of the city, public space as a space of relationship between dynamic (mobility flows) and static (architectures) elements of urban ecosystem and finally future of mobility dynamics.</p> <ul style="list-style-type: none"> <li>▪ Scenarioscoping</li> </ul> <p>In this workshop, students will explore how scenario planning tools can help designers to plan more durable futures.</p> <p>Borrowing from forecasting strategies used in economic and political fields, we will investigate how the whimsical act of charting plausible futures – delightful to dreadful – could guide decision-making so that today's communities can adapt in resource efficient, sustainable ways.</p> <p>How can we design to meet a population's current needs, while proactively considering the manifold "tomorrows" that might lie ahead?</p> <p>The workshop will foreground visual thinking and story-telling.</p> <ul style="list-style-type: none"> <li>▪ Studio VG13 - Masterpieces, Study of great constructions</li> </ul> <p>Throughout history, people and societies have always referred to those spaces and formal structures in which they could recognise themselves as human beings, decipher their origins, values and history, and project their dreams and aspirations for the future.</p> |



|   |   |
|---|---|
|   | <p>Cities, temples, landscape systems and architectures that stood above all else for their spatial, spiritual and constructive qualities. Qualities that made them endure.</p> <p>Starting with a list spreading from ancient to contemporary examples, students will have to unravel the principles of great architectures through iconographic research, drawings, diagrams and conceptual models.</p> <p>The purpose of this course is to learn how to analyse and examine the hidden principles of architecture and built environments, while exposing students to excellent examples that can enrich one's cultural background.</p> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Workshop on campus and online meetings  |
| Examination   | Student research project  |
| Literature list   | To be offered by the lecturer   |

2.5.2 English Bachelor Thesis – Energy Engineering  
(German title: Bachelorarbeit auf Englisch)

|   |   |
|---|---|
| Credits (ECTS)  | 12 ECTS + 2 ECTS (seminar)  |
| Lecture hours (SWS)   | 1 SWS (seminar)   |
| Prerequisite  | Sufficient knowledge in Energy Engineering  |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Depending on topic  |
| Objectives<br>(Learning Outcome)  | The students acquire the ability to work independently to formulate, solve, document, and present a problem.  |
| Lecture topics  | In the colloquium for the bachelor thesis, students learn by a guided seminar on how they, in the course of their thesis, familiarize themselves with a topic, create a schedule and project plan, conduct a literature review, propose solutions and evaluate as well as implement or realize solutions and submit and present a scientific paper. |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Project work, Seminar   |
| Examination   | Project work  |
| Literature list   | Topic specific  |

*\*student can choose to take either the Project work or Bachelor Thesis*

2.5.3 Summer School - Energy Engineering

“Applied Experimental Design and Statistical Analysis”

|   |   |
|---|---|
| Credits (ECTS)  | 2 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  |   |
| Semester<br>(Summer/Winter/Both)  | Summer  |
| Lecturer  | Prof. Dale Tiller   |
| Objectives<br>(Learning Outcome)  | <ol style="list-style-type: none"> <li>1. Develop an understanding of the basic principles and concepts of experimental design;</li> <li>2. Develop an understanding of the basic principles and concepts involved in statistical analysis;</li> <li>3. Develop your ability to design experiments, select appropriate statistical analysis methods, apply these methods to analyze data, and draw appropriate conclusions;</li> <li>4. Develop your analytical and writing skills.</li> </ol>  |
| Lecture topics<br>(content)   | This course is an overview of experimental methods and statistical analysis techniques, specifically as these are applied to the planning, execution, analysis and description of experiments in architectural engineering and other fields.  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture   |
| Examination   | Written examination   |
| Literature list   | <p>Levin, I.P. (1999). <i>Relating Statistics and Experimental Design: An Introduction</i>. Sage Publications. ISBN = 0761914722.</p> <p><a href="http://www.sagepub.com/booksProdDesc.nav?prodId=Book9186&amp;">http://www.sagepub.com/booksProdDesc.nav?prodId=Book9186&amp;</a><br/> <a href="http://www.amazon.com/Relating-Statistics-Experimental-Design-Introduction/dp/0761914722/ref=sr_1_1?ie=UTF8&amp;qid=1294761707&amp;sr=8-1">http://www.amazon.com/Relating-Statistics-Experimental-Design-Introduction/dp/0761914722/ref=sr_1_1?ie=UTF8&amp;qid=1294761707&amp;sr=8-1</a></p> |

#### 2.5.4 Summer School - Energy Engineering

##### “Photovoltaic and Electrical System Design in Buildings”

|   |  |
|---|--|
| Credits (ECTS)  | 2 ECTS   |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  |  |
| Semester<br>(Summer/Winter/Both)  | Summer   |
| Lecturer  | Prof. Mahmoud Alahmad  |
| Objectives<br>(Learning Outcome)  | The course will introduce the integration of renewable energy sources into the electric grid and the built environment. Then, various renewable energy sources with a focus on Photovoltaic systems will be introduced. The course will detail Photovoltaic systems theory of operation, design methodologies, system components, NEC & IEC code requirements and simulation software for stand-alone, utility interactive and multimode systems. In addition, the course will discuss electrical power system design basics and requirements for the built environment. |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Analysis and design of power systems in buildings</li> <li>▪ Theory and applications of photovoltaic systems</li> <li>▪ NEC and IEC</li> </ul>  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture  |
| Examination   | Design project   |
| Literature list   | To be provided   |

## 2.5.5 Introduction to Lighting Technology - Energy Engineering

|   |   |
|---|---|
| Credits (ECTS)  | 2 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  | No prerequisite   |
| Semester<br>(Summer/Winter/Both)  | Winter  |
| Lecturer  | Prof. Dale Tiller, University of Nebraska   |
| Objectives<br>(Learning Outcome)  | <ol style="list-style-type: none"> <li>1. Learn the fundamental aspects of light, vision, and lighting equipment as required to understand simple interior architectural lighting systems;</li> <li>2. Become familiar with and conversant in the language used in architectural lighting;</li> <li>3. Develop an understanding of the concepts and design process used in architectural lighting;</li> <li>4. Attain the competence to solve simple lighting problems;</li> <li>5. Develop the ability to present and describe lighting system designs with clarity and professionalism;</li> <li>6. Raise awareness of the role of lighting in one's life by sharpening observation.</li> </ol> |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Light Sources, Fundamental Terms and Photometric Units</li> <li>▪ Luminaires and Photometric Reports, Point Calculations</li> <li>▪ Zonal Cavity/Lumen Method</li> <li>▪ Statutory Requirements</li> <li>▪ Introduction to Lighting Design Process</li> <li>▪ Introduction to Daylighting</li> </ul>   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Online lecture  |
| Examination   | <p>Homework assignment (3 – 6 throughout the semester) (25%)</p> <p>Midterm examination (25%)</p> <p>Final examination (50%), delivered on the last day of the class</p>  |
| Literature list   | Grondzik, W.T. & Kwok, A.G. (2015). <i>Mechanical and Electrical Equipment for Buildings</i> (Twelfth Edition). John Wiley & Sons: New York.  |

## 2.5.6 Building Communication Systems - Energy Engineering

|   |   |
|---|---|
| Credits (ECTS)  | 2 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  | No prerequisite   |
| Semester<br>(Summer/Winter/Both)  | Winter  |
| Lecturer  | Prof Mahmoud Alahmad, University of Nebraska  |
| Objectives<br>(Learning Outcome)  | Provide basic understanding of Data Communication and network design to provide the built environment with the infrastructure to support technology for today's need as well as the future.   |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Course Introduction &amp; Building Low Voltage systems</li> <li>▪ Building communication system</li> <li>▪ Network Architecture</li> <li>▪ Network Model (Physical Layer)</li> <li>▪ Network Hardware</li> <li>▪ Telecommunication System Design</li> <li>▪ Electrical/mechanical design Considerations</li> </ul> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Online lecture  |
| Examination   | Homework/Projects (50%): 3-6 homework assignments will be given throughout the semester, design projects to implement knowledge learned from the course.<br>Research Paper (50%): Research a topic, develop ideas, write a technical paper and present the topic during a 20-30 min presentation.   |
| Literature list   | To be provided  |

### 2.5.7 Project work Construction Engineering – Civil Engineering

Students of Civil Engineering can choose **one project work** of either Construction Engineering or Urban Water Management.

|  |   |
|--|---|
| Credits (ECTS)   | 2 ECTS  |
| Lecture hours (SWS)  | 2 SWS   |
| Prerequisite   | Knowledge in steel construction, timber construction and solid construction   |
| Semester (Summer/Winter/Both)  | Both  |
| Lecturer   | Prof. Dr.-Ing Christian Kulas, Dipl.-Ing. Thorsten Meinhardt  |
| Objectives (Learning Outcome)  | The students can plan, design, calculate and construct a concrete project in the field of structural design using engineering and scientific methods. In doing so, solution competence, basic research and teamwork are particularly developed. |
| Lecture topics (content)   | Independent processing of a project in a team with defined interim presentations and a final presentation.  |
| Teaching format (e.g. online / in person lecture / Seminar / Lab etc.) | Project study, corrections, presentations.  |
| Examination  | Project work  |
| Literature list  | Project related technical literature and planning documents.  |

### 2.5.8 Project work Urban Water Management – Civil Engineering

Students of Civil Engineering can choose **one project work** of either Construction Engineering or Urban Water Management.

|  |  |
|--|--|
| Credits (ECTS)   | 2 ECTS   |
| Lecture hours (SWS)  | 2 SWS  |
| Prerequisite   | Knowledge in Urban Water Management and planning techniques  |
| Semester (Summer/Winter/Both)  | Both   |
| Lecturer   | Prof. Dr. Julius Jara, Prof. Dr.-Ing. Ulrike Zettl   |
| Objectives (Learning Outcome)  | The students are able to familiarize themselves with a concrete problem in the field of urban water management and to solve and present the problem in the form of a study using scientific methods.<br>The basic knowledge, solution competence and the ability to work in a team are particularly pronounced (including self-organization).  |
| Lecture topics (content)   | <ul style="list-style-type: none"> <li>▪ Inventory determination, determination of demand, location determination.</li> <li>▪ Performance of special investigations (e.g. discharge measurements, quality measurements).</li> <li>▪ Compilation and interpretation of project data.</li> <li>▪ Development of proposals and variant solutions.</li> <li>▪ Reporting / presentation of results with discussion</li> </ul> |
| Teaching format (e.g. online / in person lecture / Seminar / Lab etc.) | Project study, corrections, presentations.   |
| Examination  | Project work   |
| Literature list  | Project documents (depending on the task).   |



## 2.5.9 Intercultural Cooperation in Civil Engineering - Civil Engineering

*(available only if there are enough participants)*

|   |  |
|---|--|
| Credits (ECTS)  | 1 ECTS   |
| Lecture hours (SWS)   | 1 SWS  |
| Prerequisite  | Fundamental knowledge in Civil Engineering   |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Prof. Dr.-Ing. Gerhard Haimerl / Andreas Kielwein  |
| Objectives<br>(Learning Outcome)  | Driven by globalization, companies not only expect graduates to have skills in the technical and methodical area, but also increasingly to be able to handle construction projects in an intercultural context. The course lays the foundations for the most important terms and develops an understanding of one's own culture with the students. The course conveys what is meant by culture and interculturality, how culture is acquired, which explanatory models there are for dealing with different cultures and which typical conflicts and possible solutions arise from them. In practice, the main concern is how cooperation can succeed across cultures. |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Definition and importance of intercultural cooperation in the construction industry</li> <li>▪ Examples of cross-cultural projects/organizations</li> <li>▪ Cultural comparative approaches and models</li> <li>▪ Exemplary cultural focal points (Asia, North America, Arabian region, inner-European) and differences</li> <li>▪ Problems and conflicts of intercultural cooperation</li> <li>▪ Intercultural competences and professional cooperation</li> <li>▪ Professional intercultural communication - and conversation</li> <li>▪ Possibilities of integration and procedures in conflicts</li> </ul>                |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, group work, dialogue discussions, individual work, case studies, business simulation games  |
| Examination   | Term paper   |
| Literature list   | N/A  |

2.5.10 English Bachelor Thesis - Civil Engineering  
(German title: Bachelorthesis)

|   |  |
|---|--|
| Credits (ECTS)  | 10 + 2 ECTS  |
| Lecture hours (SWS)   | N/A  |
| Prerequisite  | Sufficient knowledge in Civil Engineering  |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Depending on topic   |
| Objectives<br>(Learning Outcome)  | The student has sufficient knowledge to comprehensively work on the topic of the Bachelor thesis. The student has the engineering skills to work on the topic and has the competence to apply existing knowledge to new issues. The student has the competence to independently work on a problem from the subject according to scientific methods within a given period of time.  |
| Lecture topics<br>(content)   | The topic of the Bachelor's thesis is located in a subject area relevant to the course of study. The chosen area of specialization must be taken into account.<br>The topic and content of the Bachelor's thesis are determined by the supervisor. The bachelor's thesis should be written according to scientific principles. The Bachelor's thesis will be presented in a colloquium. The form and content of the colloquium will be determined by the supervisor. |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Project  |
| Examination   | One copy of the thesis is to be handed in at the examination office; the number and form (e.g. as PDF) of further copies to be handed in are determined by the supervisor. In addition, a short version of the Bachelor's thesis and a poster must be submitted. There has to be a presentation at the end.  |
| Literature list   | Topic-specific literature  |

2.5.11 Subject English 1 – Project Management  
(German title: Fachenglisch 1)

|   |  |
|---|--|
| Credits (ECTS)  | 2 ECTS   |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  |  |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Michael Errington  |
| Objectives<br>(Learning Outcome)  | <p>Students can communicate competently in English in a business and technical context.</p> <p>In addition, students can follow and actively contribute to English-language business meetings and negotiations. They can also conduct business telephone conversations, write texts and give presentations in English.</p> <p>In a technical context, students can understand, describe and discuss technical drawings, situations and reports in the target language. They can also summarise and discuss technical problems in English to find a solution.</p> |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Discussions and exercises in a business and technical context in English</li> <li>▪ Small talk in English</li> <li>▪ Tasks in a technical and business context e.g. role plays in English</li> <li>▪ Vocabulary technical English and terms in English</li> <li>▪ Presentation exercises in English</li> <li>▪ Relevant grammar exercises in English</li> </ul>   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture and Practice   |
| Examination   | Written exam, Ungraded seminar paper   |
| Literature list   | Sharon Heidenreich: Englisch für Architekten und Bauingenieure Springer Vieweg, 5. Auflage (2016)  |

2.5.12 Visualization and Presentation – Project Management  
(German title: Visualisierung und Präsentation)

|   |   |
|---|---|
| Credits (ECTS)  | 2 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  |   |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Fabiola Schmidt   |
| Objectives<br>(Learning Outcome)  | The students learn skills and abilities, presentations for different to create different occasions. The students are able to present and to prepare, develop, create with the help of various media, presented and discussed interactively with those involved. The students acquire the ability to create an application portfolio, Recognize and evaluate pitfalls when applying. They are methodical able to organize the entire application process.  |
| Lecture topics<br>(content)   | <p>PART 1 – Presentation and visualization of topics and content<br/> Overview of visualization software, such as PowerPoint, Prezi etc.<br/> Creation of a master slide for the semester<br/> What do we mean by an innovative visualization (presentation)?<br/> Opportunities and risks of multimedia presentations<br/> Preparation and design of the presentation (exercises, text charts, mind maps, structural images)<br/> Preparing the performance, presenting it convincingly<br/> Interact and discuss confidently</p> <p>PART 2 – Presentation and visualization of yourself<br/> Overview of the application process, career planning<br/> Self-assessment using color theory<br/> Types of application, job search<br/> Development of your own application strategy and portfolio<br/> Structure of application folder (explanation of attachments such as CV, references...)<br/> Pitfalls and hurdles of the application<br/> Interview</p> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, Working in Teams   |
| Examination   | Paper   |
| Literature list   |   |

2.5.13 Project management fundamentals – Project Management  
(German title: Grundlagen Projektmanagement)

|   |  |
|---|--|
| Credits (ECTS)  | 2 ECTS   |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  | None   |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Jens Schmid  |
| Objectives<br>(Learning Outcome)  | <p>The participants receive an overview of the fundamentals of the project environment and the interrelationships of the individual project-relevant knowledge areas. The aim is to provide students with an overall understanding of the topic of project management, on the basis of which further project competencies can be developed. At the end of the course, students will be able to explain and apply fundamental project management processes and techniques.</p> <p>The students are essentially able to comprehend or plan a project with regard to professional competence, methodological competence, organisational competence and social competence.</p> |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ What are the characteristics of a project?</li> <li>▪ What is project management?</li> <li>▪ Overview and integration of the project-relevant thematic areas: Project content/scope, scheduling and cost planning, resource planning and procurement, risks, stakeholders and communication.</li> <li>▪ Success criteria of holistic project management in terms of the common knowledge carriers in the context of the process groups and topic areas</li> </ul> <p>Develop basic project planning.</p>  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, Tutorials, Group work   |
| Examination   | Written assessment   |
| Literature list   | <ul style="list-style-type: none"> <li>▪ Bau-Projekt-Management, Grundlagen und Vorgehensweisen, 5. Auflage, 2018, (Kochendörfer, Liebchen, Viering)</li> <li>▪ Projektmanagement, 4. Auflage, 2018 (Litke, Kunow, Schulz-Wimmer) Kompetenzbasiertes Projektmanagement (PM4), Handbuch für Praxis und Weiterbildung im Projektmanagement, GPM Deutsche Gesellschaft für Projektmanagement e. V. (Hrsg.). (IPMA)</li> <li>▪ A Guide to Project Management Body of Knowledge, PMBOK Guide, 6.</li> </ul> <p>Ausgabe, 2017, Project Management Institute, Inc.</p>  |

2.5.14 Introduction to Construction Management – Project Management  
(German title: Grundlagen Baumanagement (BBP10\_GPS))

|   |   |
|---|---|
| Credits (ECTS)  | 2 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  | No Prerequisite   |
| Semester  | Both  |
| Lecturer  | Prof. Dr.-Ing. Alexander Glock  |
| Objectives<br>(Learning Outcome)  | To provide an understanding of construction management issues within construction project management that enables a person to understand the preparation and execution of construction measures from the contractor's point of view. Teaching the fundamentals for more advanced modules of construction operations, and for comparison with the client-side view in the modules of cost and schedule planning. In order to take into account the internationalisation of the construction industry, some courses are taught in English.                                      |
| Lecture topics  | Teaching basic construction, technical, organisational and economic knowledge: <ul style="list-style-type: none"> <li>▪ Those involved in the construction</li> <li>▪ Project management in the construction industry</li> <li>▪ Tasks of construction operations</li> <li>▪ Basic concepts of the organisational structure</li> <li>▪ Basic concepts of sequence planning</li> <li>▪ Fundamentals of scheduling, capacity and cost planning</li> <li>▪ Presentation of selected construction methods</li> <li>▪ Occupational health, safety and health protection</li> </ul> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, tutorial, group work   |
| Examination   | Ungraded seminar paper, Module assessment   |
| Literature list   | Lecture slides, <ul style="list-style-type: none"> <li>• Berner, Kochendörfer, Schach: Grundlagen der Baubetriebslehre 1</li> <li>• Berner, Kochendörfer, Schach: Grundlagen der Baubetriebslehre 2</li> <li>• Berner, Kochendörfer, Schach: Grundlagen der Baubetriebslehre 3</li> <li>• Hoffmann: Zahlentafeln für den Baubetrieb</li> <li>• Gralla: Baubetriebstabellen</li> </ul>   |

2.5.15 Construction process engineering – Project Management  
(German title: Bauverfahrenstechnik)

|   |  |
|---|--|
| Credits (ECTS)  | 2 ECTS   |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  | No Prerequisite  |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Prof. Dr.-Ing. Alexander Glock   |
| Objectives<br>(Learning Outcome)  | The students acquire an overview of essential areas of construction process engineering. They know the essential construction methods and can select suitable construction methods and equipment. The students are able to create a work preparation concept for a construction project. In order to take into account the internationalisation in the construction industry, this course is held in English.  |
| Lecture topics<br>(content)   | <ul style="list-style-type: none"> <li>▪ Construction management technology in construction management theory</li> <li>▪ Overview and classification of construction machinery</li> <li>▪ Lifting equipment in structural engineering</li> <li>▪ Presentation of selected construction machines and their areas of application</li> <li>▪ Earthworks construction methods</li> <li>▪ Construction methods of reinforced concrete construction (forming, reinforcing, concreting)</li> <li>▪ Bridge construction method</li> <li>▪ Process selection</li> </ul> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, tutorial, group work  |
| Examination   | Module assessment  |
| Literature list   | <p>Gerster R., Kohl H.: Baubetrieb in Beispielen, Werner Verlag 2003<br/>           Bauer: Baubetrieb, 3. Auflage (2007)<br/>           Proporowitz: Baubetrieb – Bauverfahren (2008)<br/>           Hoffmann M.: Zahlentafeln für den Baubetrieb 7. Aufl. Teubner Verlag 2006<br/>           Baugeräteliste (BGL) 2015: Bauverlag BvGmbH; (2015)<br/>           Sharon Heidenreich: Englisch für Architekten und Bauingenieure(2011)</p>  |

2.5.16 Engineering project with BIM 1 – Project Management  
(German title: Ingenieurprojekt mit BIM 1)

|   |  |
|---|--|
| Credits (ECTS)  | 3 ECTS   |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  | none   |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Prof. Dr.-Ing. Hannes Schwarzwälder  |
| Objectives<br>(Learning Outcome)  | <p>Application of the fundamentals for the creation of digital building models. With the help of a construction project, students are enabled to independently prepare and create building models and derive information from them (plans, tables).</p> <p>Students learn the fundamentals of transferring model data to software for evaluation (open BIM and closed BIM)</p>   |
| Lecture topics  | <p>The following contents are taught in the Building Information Modelling 1 module:</p> <ul style="list-style-type: none"> <li>▪ Creation of AIA and BAP, as well as model parameters</li> <li>▪ Project concept for the interaction of software, hardware and network systems</li> <li>▪ Transferring the project requirements into the software landscape</li> <li>▪ Creation of projects and families</li> <li>▪ Derivation of construction documents (plan documents, table output formats (open and closed formats)</li> </ul> |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lectures, Tutorial, Group work   |
| Examination   | Written assessment   |
| Will be announced in the lecture  | Will be announced in the lecture   |



2.5.17 Road planning and design – Project Management  
(German title: Planung und Entwurf von Straßen)

|   |   |
|---|---|
| Credits (ECTS)  | 3 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  | Knowledge of the contents of the course PB03-3 Surveying, PB09-1 Engineering geology and PB09-2 Geotechnics 1   |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Prof. Dr.-Ing. Florian Schäfer  |
| Objectives<br>(Learning Outcome)  | The students know the essential procedures in the planning process for the most important mode of transport – the “road”. They know the calculation methods required for the planning of roads. For extra-urban roads, they know the requirements of the technical regulations at the various design levels. They are able to plan extra-urban roads at the different design levels. They have the ability to link the different design levels. They have the competence to implement the requirements of the technical regulations in planning, taking into account the consideration of different interests, and to evaluate variants. They know the structure of the road administration in Germany. |
| Lecture topics  | <ul style="list-style-type: none"> <li>▪ Fundamentals of the planning process</li> <li>▪ Categorisation in the road network</li> <li>▪ Draft for site plan</li> <li>▪ Draft for elevation plan</li> <li>▪ Cross-section design and dimensioning</li> <li>▪ Spatial line management</li> <li>▪ Structure of the Road Administration</li> </ul>   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, tutorials, group work  |
| Examination   | Ungraded seminar paper + Module assessment  |
| Literature list   | Guidelines for Integrated Network Design (RIN 2008),<br>Guidelines for the Construction of Motorways (RAA 2008),<br>Guidelines for the Construction of Rural Roads (RAL 2012)   |

2.5.18 Road construction and equipment – Project Management  
(German title: Straßenbau und Ausstattung)

|   |  |
|---|--|
| Credits (ECTS)  | 2 ECTS   |
| Lecture hours (SWS)   | 2 SWS  |
| Prerequisite  | Knowledge of the contents of the course PB03-3 Surveying, PB09-1 Engineering geology and PB09-2 Geotechnics 1  |
| Semester<br>(Summer/Winter/Both)  | Both   |
| Lecturer  | Prof. Dr.-Ing. Florian Schäfer   |
| Objectives<br>(Learning Outcome)  | The students know the fundamentals of dimensioning the road structure according to RStO. They have the ability to determine a construction class and select a road structure. They know the fundamentals of the materials asphalt and concrete for road construction. They know which requirements exist for the road structure according to technical regulations. They know the essential requirements for road equipment, drainage dimensioning and noise protection. They have the ability to calculate the flows required for the dimensioning of drainage facilities. They can calculate emission levels for simple boundary conditions according to the guidelines for noise protection and have the ability to assess measures for noise protection. |
| Lecture topics  | <ul style="list-style-type: none"> <li>▪ Design of the road surface</li> <li>▪ Road construction materials</li> <li>▪ Base courses and road surfaces</li> <li>▪ Road renewal</li> <li>▪ Equipping and marking roads</li> <li>▪ Drainage facilities</li> <li>▪ Calculation of noise emissions according to RLS</li> <li>▪ Measures to reduce noise emissions</li> </ul>   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, tutorials, group work   |
| Examination   | Ungraded seminar paper + Module assessment   |
| Literature list   | Guidelines for the Standardisation of the Superstructure of Traffic Areas (RStO 2012),<br>Guidelines for the Construction of Roads – Part: Drainage (RAS-Ew 2005), Guidelines for Noise Protection on Roads (RLS 90)   |

2.5.19 International Contract Management – Project Management  
(German title: Internationales Vertragsmanagement (PB 20-3))

|  |  |
|--|--|
| Credits (ECTS)   | 2 ECTS   |
| Lecture hours (SWS)  | 2 SWS  |
| Prerequisite   | Knowledge of the contents of the course PB05-3 Fundamentals of private construction law. Basic knowledge of VOB B and VOB C, acquisition of the necessary admission to written examinations in the second stage of studies in accordance with SPO § 28 (3) Structure of the degree programme   |
| Semester (Summer/Winter/Both)  | Both   |
| Lecturer   | Prof. Dr.-Ing. Alexander Glock   |
| Objectives (Learning Outcome)  | The students know the tasks of a contract manager and how to deal with Anglo-American international contracts. Students are aware of the contractual risks of international projects and are able to adequately discuss them with a specialist lawyer.   |
| Lecture topics (content)   | <ul style="list-style-type: none"> <li>▪ What is Contract Management and Contract Administration for a contractor (to the client and to subcontractors)?</li> <li>▪ What are the differences in the international Anglo-American project environment compared to German contract management?</li> <li>▪ Procurement process</li> <li>▪ Introduction of different contract models (FIDIC, NEC, ICE, etc.)</li> <li>▪ Special features in Anglo-American contracts</li> <li>▪ Applicable law for international projects</li> <li>▪ Claim management from the perspective of the construction company</li> <li>▪ Cultural differences between the contractual partners</li> <li>▪ Negotiation strategies</li> <li>▪ Compliance</li> <li>▪ Current international topics</li> </ul> |
| Teaching format (e.g. online / in person lecture / Seminar / Lab etc.) | Lecture, tutorials, group work   |
| Examination  | Module assessment  |
| Literature list  | Heidenreich, Sharon: Englisch für Architekten und Bauingenieure, 2012<br>Fidic: Vertragsmuster und Leitfäden; VBI<br>Further literature and technical articles will be announced in the lecture.   |

2.5.20 Project Work 1– Project Management  
(German title: Projektarbeit 1)

|                               |   |
|-------------------------------|---|
| Credits (ECTS)                | 7 ECTS  |
| Lecture hours (SWS)           | 4 SWS   |
| Prerequisite                  | Successful completion of the first stage of studies and at least 7 out of 9 modules of the modules PB08 to PB16 (see SPO § 28, (3) Construction project management/civil engineering).  |
| Semester (Summer/Winter/Both) | Both  |
| Lecturer                      | Topic specific  |
| Objectives (Learning Outcome) | <p>Students learn to organise themselves in project teams and to work independently on a given project and an individual task. To solve the holistic task, the students use the knowledge and skills they have acquired during their studies and the practical semester in a targeted manner.</p> <p>After completing the “Project work structural engineering 1”, the students are able to organise small project teams and structure and implement structural engineering projects in these teams and develop independent solutions.</p>  |
| Lecture topics (content)      | <p>The results are submitted in the form of two written papers and presented to the participants in presentations and represented in colloquia.</p> <p>A wide variety of content is developed, which is to be worked on with the skills already acquired from the studies. These include, among others:</p> <ul style="list-style-type: none"> <li>▪ Target definition</li> <li>▪ Project structuring</li> <li>▪ Project organisation</li> <li>▪ Contract management</li> <li>▪ Cost and risk management</li> <li>▪ Schedule management</li> <li>▪ Special topics (depending on the project)</li> <li>▪ Timing and technical structuring of infrastructure projects</li> <li>▪ Structural and procedural organisation</li> <li>▪ Development of procedural or plant engineering planning</li> <li>▪ Resource planning</li> <li>▪ Quality management</li> <li>▪ Variant and process comparisons and their holistic evaluation</li> <li>▪ Analysis of legal aspects and prerequisites</li> <li>▪ Prepare and conduct meetings and presentations</li> <li>▪ Preparation of written documents (minutes, decision papers, reports)</li> <li>▪ Independent source research and information procurement</li> </ul> |

|   |   |
|---|---|
|   | The results are prepared both in writing and orally, and are to be presented at the respective end of the semester on the so-called “P-day” in front of a colloquium. |
| Teaching format<br>(e.g. online / in person<br>lecture / Seminar / Lab<br>etc.) | Project   |
| Examination   | Project work (graded seminar paper and presentation)  |

2.5.21 English Bachelor Thesis – Project Management  
(German title: Bachelorthesis)

|   |   |
|---|---|
| Credits (ECTS)  | 12 ECTS   |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  | Foundation in Project Management  |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Topic specific  |
| Objectives<br>(Learning Outcome)  | The student has sufficient knowledge to comprehensively work on the topic of the bachelor thesis. The student has the engineering skills and the competence to apply existing knowledge to new issues. Student has the competence to independently work on a problem from the subject within a specified period using scientific methods. |
| Lecture topics  | Subject relevant topic  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Project   |
| Examination   | Project work  |
| Literature list   | Topic specific  |

2.5.22 Business English – Business Administration  
(BBW-17.1)

|   |   |
|---|---|
| Credits (ECTS)  | 3 ECTS  |
| Lecture hours (SWS)   | 4 SWS   |
| Prerequisite  | High School English Level   |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  | Mrs. Linda Fish   |
| Objectives<br>(Learning Outcome)  | Students should be able to use the English language in a professional and international context, acquire a good knowledge of business and economic terminology, deal with selected business tasks in English and be able to discuss technical texts in English. Students should be enabled to use English effectively and efficiently in a professional context and to express themselves clearly, fluently and in a structured manner even on complex issues. The aim is to train the four basic language skills (listening, reading, speaking and writing) in business-related contexts. The focus is on understanding and applying business texts / selected excerpts from the business press and business textbooks in English. |
| Lecture topics<br>(content)   | Development of course-related vocabulary<br>Preparation of business descriptions<br>Understanding and describing business processes and systems<br>Reading and interpreting business and annual reports<br>Understanding and writing selected business correspondence<br>Oral presentation on business topics<br>Conducting a telephone call/video conference in English<br>Participating in meetings/video conferences in English<br>Priority topics include communication, international marketing, finance, customer service, management styles and practices, and business process relationships.   |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Seminar-based teaching, exercises, group work, business game, task-based learning   |
| Examination   | Oral Exam   |
| Literature list   |   |

2.5.23 Business Models along the Energy Value Chain – Business Administration  
(BBW-EK-23.1)

|                                  |   |
|----------------------------------|---|
| Credits (ECTS)                   | 2 ECTS  |
| Lecture hours (SWS)              | 2 SWS   |
| Prerequisite                     |   |
| Semester<br>(Summer/Winter/Both) | Both (starting from winter semester 2023/24)  |
| Lecturer                         | Prof. Verena Rath   |
| Objectives<br>(Learning Outcome) | <p>Students become familiar with the various markets, business models and companies along the stages of the energy value chain. The focus is on grid-based energies and thus the electricity, gas and heating markets.</p> <p>Participants will understand the current situation in Germany and be able to analyze practical problems. They are able to consider the regulatory and technical peculiarities of the energy markets, such as governmental influence on the grid structure with multiple voltage levels/pressure levels.</p> <p>A basic overview of the German energy market in international comparison adds to their knowledge. In addition, they can name and describe the central market players. The students develop a holistic view of the energy market.</p> <p>They get to know current market trends such as consolidation or mergers in the energy market or the entry of new competitors in the field of distribution or the renaissance of municipal utilities. In addition, the course participants are familiar with the companies in the energy industry.</p> <p>They deal with company-specific factors such as the organization, size, economic development and positioning in the market context. On this basis, they are able to compare actual structures with organizational theory and analyze companies.</p> <p>Finally, we take an outlook towards the future: Due to energy transition and digitalization, the traditional value chain of the energy industry changes. Students will deal with these market dynamics and get an overview of the resulting new business models.</p> |
| Lecture topics<br>(content)      | <ul style="list-style-type: none"> <li>▪ History of the energy industry</li> <li>▪ The value chain of the energy industry</li> <li>▪ Liberalization of the market for grid-based energy</li> <li>▪ Key stakeholders in the energy industry (e.g., energy companies, grid operators, government and final customers)</li> <li>▪ Business models and companies along the energy value chain</li> <li>▪ Changes to the traditional value chain as a result of the energy transition and digitalization</li> <li>▪ New business models in the energy market</li> </ul>  |



|   |   |
|---|---|
| Teaching format<br>(e.g. online / in person<br>lecture / Seminar / Lab<br>etc.) | Lecture, discussion, group work and student presentations |
| Examination   | Written Exam  |
| Literature  |   |

2.5.24 Energy Consumption & Climate Protection Pathways– Business Administration  
(BBW-EK-23.2)

|   |   |
|---|---|
| Credits (ECTS)  | 3 ECTS  |
| Lecture hours (SWS)   | 2 SWS   |
| Prerequisite  |   |
| Semester<br>(Summer/Winter/Both)  | Both (Starting from winter semester 2023/24)  |
| Lecturer  | Prof. Grandel   |
| Objectives<br>(Learning Outcome)  | After participating in the course, students will know the main influencing factors, market structures and market processes for the supply and demand side of national and global energy consumption. The students have acquired the ability and knowledge to analyze and interpret short- and medium-term fluctuations in energy demand. They understand the interrelationships and the tension between energy consumption, energy mix and climate protection. Furthermore, students gain a deep understanding of the economic and geostrategic background and challenges of the global transformation towards climate neutrality. Students will become familiar with various sources of energy and climate data and explore the methodology for processing and correctly interpreting these data. After successful completion of the course, students will be able to build simple forecasting models for energy consumption and energy mix from a variety of different influencing factors and use them to create different future scenarios. |
| Lecture topics<br>(content)   | <p>Fundamentals of energy carriers, energy mix and energy consumption and their influence on climate change</p> <p>Influencing factors and structure of German and global primary energy consumption and its connection with climate protection</p> <p>Economic consideration of market processes and market mechanisms for the supply and demand side of energy carriers</p> <p>Data sources, data preparation and correct interpretation and application for energy and climate data</p> <p>Fundamentals and methods for forecast models and scenarios</p> <p>Development of scenarios for future national and global energy consumption in the area of conflict with climate protection</p>  |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Seminar-style instruction, discussion, group work, and student presentations.   |
| Examination   | Paper Work  |
| Literature list   |   |

2.5.25 Entrepreneurship (Design Thinking / Strategic Management / Business Planning)  
 – Business Administration  
 (BBW-UF-26)

*Teaching Language is mainly in German – Incoming students are able to join the course and examine with an English paper*

|  |  |
|--|--|
| Credits (ECTS)   | 8 ECTS   |
| Lecture hours (SWS)  | 6 SWS  |
| Prerequisite   | Basic knowledge of all business management sub-disciplines (marketing, organization, financing, internal and external accounting, etc.) is required.   |
| Semester (Summer/Winter/Both)  | Both   |
| Lecturer   | Prof. Weilepp, Prof. Henrike Mattheis  |
| Objectives (Learning Outcome)  | Starting from a problem ("Design Challenge"), the students will learn to develop a business idea adapted to customer needs in a structured way (with the help of the newly learned technique "Design Thinking"). In a guided process, they then learn the individual elements of a business plan (business idea, team, market entry strategy, business system, risk analysis, financial planning, etc.) and work these out step by step for their business idea. At the end of the course, students present and defend the business plan in front of an external jury. In this very applied module, the links between the sub-disciplines of business administration, which are usually taught independently, should be recognized and understood. In addition, presentation and argumentation skills (final presentation, elevator pitch) are to be strengthened. |
| Lecture topics (content)   | Introduction to the creativity technique "Design Thinking"<br>Introduction to the basic elements of a business plan<br>Basic concepts of strategic management  |
| Teaching format (e.g. online / in person lecture / Seminar / Lab etc.) | Lectures, design thinking workshops, group work on individual sections of the Business plan with interim presentations and discussions, final presentation to a Jury.  |
| Examination  | Project Work   |
| Literature list  |  |

2.5.26 English Bachelor Thesis – Business Administration  
(BBW-UF-TH)

|   |   |
|---|---|
| Credits (ECTS)  | 12 ECTS   |
| Lecture hours (SWS)   |   |
| Prerequisite  |   |
| Semester<br>(Summer/Winter/Both)  | Both  |
| Lecturer  |   |
| Objectives<br>(Learning Outcome)  | With the Bachelor's thesis, the student is to demonstrate his or her ability to independently and scientifically work on a topic both in its subject-specific details and in the interdisciplinary contexts on the basis of the subject knowledge and methodological competence acquired in the previous semesters within a specified period of time. The latter includes the examination and critical evaluation of the relevant specialist literature and the examination of the methods used in practice.  |
| Lecture topics<br>(content)   | The Bachelor's thesis represents a subject-related consolidation of one or more study modules and also frequently builds on the experiences of the practical study semester. The topic is assigned in close consultation between the student and the supervisor. This is a professor of the study program - if necessary also in cooperation with a lecturer or with a company. During the preparation of the thesis, which often contains company-specific questions and can be written in cooperation with companies from various industries, the supervisor is available to support the student. In this context, the structuring and organization of the thesis as well as subject-specific technical and factual problems that arise in the context of the preparation of a more extensive scientific written work are regularly discussed. The Bachelor's thesis usually ends with a final discussion between the supervising professor and the student. The form and content of the final discussion is determined by the supervising professor. |
| Teaching format<br>(e.g. online / in person lecture / Seminar / Lab etc.) | Subject-specific Design   |
| Examination   | Paper Work  |
| Literature list   |   |