# Course Handbook Biomedical Engineering Bachelor

created at 03.08.2026,10:52

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| Head of Studies | Prof. Dr. Robert Lemor |
| Deputy Head of Studies | Prof. Dr. Dr. Daniel Strauß |
| Chairman of Examination | Prof. Dr. Wenmin Qu |
| Deputy Chairman of Examination | Prof. Dr. Robert Lemor |

# Qualifikation Goals of Study Programme

# Biomedical Engineering Bachelor - mandatory courses (overview)

| Module name (EN) | Code | SAP-P | Semester | Hours per semester week / Teaching method | ECTS | Module coordinator |
|---|---|---|---|---|---|---|
| Anatomy and Physiology | BMT3103.ANA | P213-0215 | 1 | 6V | 5 | Dr. Sebastian Markert |
| Business and Technical English 1 | BMT3306.EN1 | | 3 | 1V+1U | 2 | Dr. Yuliya Stodolinska |
| Business and Technical English 2 | BMT3405.EN2 | P213-0242 | 4 | 1V+1U | 2 | Dr. Yuliya Stodolinska |
| Business and Technical English 3 | BMT3504.EN3 | P213-0249 | 5 | 1V+1U | 2 | Dr. Yuliya Stodolinska |
| Design Engineering and Materials Science | BMT3304.KON | P213-0231, P213-0232 | 3 | 5V | 5 | Prof. Dr. Moritz Habschied |
| Medical Economics | BMT3602.ECO | P213-0251 | 6 | 3V | 3 | Prof. Dr. Robert Lemor |
| NeuroInsight: Fundamental Areas of Neurotechnology | BMT3502.NIS | P213-0246, P213-0247 | 5 | 4V+1P | 5 | Prof. Dr. Dr. Daniel Strauß |
| Procedural Programming with C / C++ | BMT3305.PRG | P213-0233 | 3 | 4V+2U | 7 | Prof. Dr. Reinhard Brocks |

| Module name (EN) | Code | SAP-P | Semester | Hours per semester week / Teaching method | ECTS | Module coordinator |
|---|---|---|---|---|---|---|
| Signal and Systems Theory | BMT3405.SUS | | 4 | 3V+1U | 5 | Prof. Dr. Martin Buchholz |

(9 modules)

# Biomedical Engineering Bachelor - optional courses (overview)

| Module name (EN) | Code | SAP-P | Semester | Hours per semester week / Teaching method | ECTS | Module coordinator |
|---|---|---|---|---|---|---|
| Brain-Computer Interface | BMT2613.BCI | P221-0183 | 6 | 1V+3PA | 6 | Prof. Dr. Dr. Daniel Strauß |
| Classic Image Processing Algorithms with LabVIEW | BMT2592.KBL | P213-0273 | 6 | 2V+2U | 5 | Prof. Dr. Michael Kleer |
| Cochlear Implants in Practice | BMT2612.CI | P120-0357 | 6 | - | 5 | Prof. Dr. Dr. Daniel Strauß |
| Computer Networks | BMT2551.RN | | - | 2V+2P | 5 | Prof. Dr. Steffen Knapp |
| Digital Skills for Engineers | BMT2552.DSI | P213-0187 | 5 | 2V+2P | 5 | Andreas Schaffhauser, M.Sc. |
| Engineering Design Methodology | BMT2410.KON | P213-0195 | - | 2V+2PA | 4 | Prof. Dr. Andrea Bohn |
| Fundamentals of 3D Design using Inventor | BMT2521.INV | P231-0104 | - | 2V+2U | 5 | Prof. Dr. Bernd Heidemann |
| Kinematic Principles of Robotics | BMT2505.KGR | P221-0197 | 5 | 3V+1U | 5 | Prof. Dr. Michael Kleer |

| Module name (EN) | Code | SAP-P | Semester | Hours per semester week / Teaching method | ECTS | Module coordinator |
|---|---|---|---|---|---|---|
| Machine Learning and Deep Learning in Medicine | BMT2524.MLM | P213-0207 | 5 | 2S | 3 | Prof. Dr. Robert Lemor |
| Mentoring | BMT2590.MEN | P200-0018 | 5 | 2S | 2 | Sandra Wiegand, M.A. |
| Methods in Radiology | BMT2614.RAD | P213-0040 | 6 | 1V+1P | 2 | Prof. Dr. Dr. Dirk Pickuth |
| Oral and General Presentation Skills in the Engineering Sciences | BMT2581.RPR | P200-0019 | - | 2V | 2 | Dr. Peter Ludwig |
| Oral Presentation Skills | BMT2591.RPR | P222-0038 | - | 2S | 2 | Studienleitung |
| Preparing for the IELTS Test | BMT2640.IELTS | P213-0041 | 6 | 2VU | 2 | Dr. Yuliya Stodolinska |
| Statistical Methods with SPSS | BMT2522.SPSS | | 5 | - | 5 | Prof. Dr. Gerald Kroisandt |
| Technical Documentation | BMT2580.TDO | | - | 2V | 2 | Dipl.-Ing. Irmgard Köhler-Uhl |
| The Impact of Gender and Diversity on Careers and Studies (Submodule) | BMT2583.AGDT | P213-0188 | 5 | - | 3 | Sandra Wiegand, M.A. |

(17 modules)

# Biomedical Engineering Bachelor - mandatory courses

## Anatomy and Physiology

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|---|
| **Module name (EN): Anatomy and Physiology** |
| **Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025 |
| **Module code:** BMT3103.ANA |
| **Hours per semester week / Teaching method:**<br>6V (6 hours per week) |
| **ECTS credits:**<br>5 |
| **Semester:** 1 |
| **Mandatory course:** yes |
| **Language of instruction:**<br>German |
| **Assessment:**<br>Exam<br><br>[*updated 21.10.2024*] |
| **Applicability / Curricular relevance:**<br><br>BMT2103.ANA (P213-0004) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 1, mandatory course<br>BMT3103.ANA (P213-0215) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 1, mandatory course |
| **Workload:**<br>90 class hours (= 67.5 clock hours) over a 15-week period.<br>The total student study time is 150 hours (equivalent to 5 ECTS credits).<br>There are therefore 82.5 hours available for class preparation and follow-up work and exam preparation. |
| **Recommended prerequisites (modules):**<br>None. |
| **Recommended as prerequisite for:** |
| **Module coordinator:**<br>Dr. Sebastian Markert |
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**Lecturer:** Dr. Sebastian Markert

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this course, students will be able to describe the most important functional and structural systems of the human organism and be familiar with subject-specific terms, their linguistic formation and meaning. This will allow students to independently use medical textbooks and other literature and communicate with members of medical professions in their future area of work.

Students will be able to explain the physiological processes in the 4 large systems of the human body and their interaction, in particular the functions of the nervous system and the sensory organs, based on properties at the cellular and tissue level. They will be able to explain basic clinical applications.

[*updated 21.10.2024*]

**Module content:**
1. The basics
 1.1 Terminology Basic terms (orientations, levels, designations)
 1.2. An overview of the structures and functions of the body
 1.3 Important functional systems

2. The Cell - Cytology
 2.1 Cell components
 2.2 Metabolic processes
 2.3 Proteins and protein biosynthesis

3. Tissue - Histology
 3.1 Epithelia
 3.2 Connective tissue
 3.3 Muscle tissue
 3.4 Nerve tissue

4. Physiology of excitable cells
 4.1 Synapses
 4.2 Receptors
 4.3 Neurotransmitters
 4.4 Membrane potential, Na+/K+-ATPase
 4.5 Action potential
 4.6 Neuromuscular synapses

5. The nervous system
 5.1 General structure
 5.2 The brain
 5.3 Spinal cord
 5.4 Meninges
 5.5 The blood-brain barrier
 5.6 Motor systems, reflexes
 5.7 Sensory organs

6. Cardiovascular system, blood
 6.1 Structure
 6.2 Anatomy and physiology of the heart
 6.3 Transport of oxygen

7. Respiratory organs
 7.1 Structures
 7.2 Respiratory mechanics and lung volumes

8. Kidney and acid-base balance, chemical buffer system

[*updated 21.10.2024*]

**Teaching methods/Media:**
Lecture notes, selected images as electronic or print media
Anatomical models for demonstrations and self-study.
Practical demonstrations are offered on a voluntary basis in collaboration with the Institute of Anatomy at the University Hospital in Homburg.
Multimedia learning programs are available in the library for independent study.

[*updated 21.10.2024*]

**Recommended or required reading:**
Huch, Renate (Hrsg.).: Mensch, Körper, Krankheit, Urban & Fischer, (latest edition)
Schwegler, Johann S.: Der Mensch - Anatomie und Physiologie, Georg Thieme, (latest edition)
Speckmann; Wittkowski: Bau und Funktionen des menschlichen Körpers, Urban & Fischer, (latest edition)

Available to download in PDF format from the htw saar library:
Müller-Esterl, Werner: Biochemie: Eine Einführung für Mediziner und Naturwissenschaftler (akt. Aufl.)
Beck, Henning: Faszinierendes Gehirn: Eine bebilderte Reise in die Welt der Nervenzellen (akt. Aufl.)
Feigenspan, Andreas: Prinzipien der Physiologie: Grundlegende Mechanismen und evolutionäre Strategien (akt. Aufl.)

[*updated 21.10.2024*]

# Business and Technical English 1

**Module name (EN): Business and Technical English 1**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3306.EN1

**Hours per semester week / Teaching method:**
1V+1U (2 hours per week)

**ECTS credits:**
2

**Semester:** 3

**Mandatory course:** yes

**Language of instruction:**
English

**Assessment:**
Written exam

[*updated 05.11.2025*]

**Applicability / Curricular relevance:**

BMT2306.EN1 (P213-0013) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 3, mandatory course
BMT3306.EN1 Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 3, mandatory course

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Dr. Yuliya Stodolinska

**Lecturer:**
Dipl.-Übers. Eva Langenbahn

[*updated 25.09.2025*]

**Learning outcomes:**
Note: The Business and Technical English 1, 2 and 3 modules are to be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2. The focus of this module is on oral communication in the professional environment.

About the Business and Technical English 1 module: After successfully completing this module, students will have received insight into the differences in international working environments, especially in English-language working environments, and can describe professional tasks with regard to BMT. They will be able to recognize potential difficulties and conflicts in intercultural communication situations and can draw conclusions for their own behaviour in international contexts. In this context, they will be able to use adequate means of speech and behaviour for specific oral communication situations. In addition, they will be sensitized to different language registers and can apply them adequately in given communication situations with international business partners.

[*updated 05.11.2025*]

**Module content:**
Module content:
- Greetings, introductions and small talk
- Describing job-related tasks
- Making phone calls in a professional context
- Making and changing appointments
- introduction to technical English / Basic concepts of biomedical engineering

In addition, we will work on:
- Vocabulary (with BMT terms)
- Repeating relevant grammatical structures
- Raising awareness for functional language use
- Intercultural aspects

[*updated 05.11.2025*]

**Teaching methods/Media:**
Teaching and learning materials for specific target groups (slides, audio, video, software),

[*updated 05.11.2025*]

**Recommended or required reading:**
The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Susanne Ley, Christine Sick: prep course English
m&eLanguageLearningPortal@CAS (learning offer to help students learn English at the htw saar Alt-Saarbrücken campus, Niveau A1-B1)

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

Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
m&eLanguageLearningPortal@CAS

[*updated 05.11.2025*]

# Business and Technical English 2

**Module name (EN): Business and Technical English 2**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3405.EN2

**Hours per semester week / Teaching method:**
1V+1U (2 hours per week)

**ECTS credits:**
2

**Semester:** 4

**Mandatory course:** yes

**Language of instruction:**
English

**Assessment:**
Written exam

[*updated 05.11.2025*]

**Applicability / Curricular relevance:**

BMT2405.EN2 (P213-0014) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 4, mandatory course
BMT3405.EN2 (P213-0242) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 4, mandatory course

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Dr. Yuliya Stodolinska

**Lecturer:**
Dipl.-Übers. Eva Langenbahn

[*updated 25.09.2025*]

**Learning outcomes:**
Note: The Business and Technical English 1, 2 and 3 modules are to be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

About the Business and Technical English 2 module: Students will learn to use the various language registers effectively in various written communication situations with international business partners. In addition, they will continue to develop their understanding of functional language usage and apply this to the structure of a presentation and the selection of appropriate means of speech for its linguistic implementation.

[*updated 05.11.2025*]

**Module content:**
Correspondence with business partners
- Letters and e-mails: Structure and linguistic implementation

Presentations
- Strategic knowledge
- Structure of an English presentation
- Structures for linguistic implementation
- Describing tools, causes and cause-effect relationships and trends

In addition, we will work on:
- Grammar
- Vocabulary in particular with regard to the description of materials in biomedical engineering and their properties, material compounds, positions and devices

[*updated 05.11.2025*]

**Teaching methods/Media:**
Teaching and learning materials for specific target groups (slides, audio, video, software)

[*updated 05.11.2025*]

**Recommended or required reading:**
The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Susanne Ley, Christine Sick: prep course English
m&eLanguageLearningPortal@CAS (learning offer to help students learn English at the htw saar Alt-Saarbrücken campus, Niveau A1-B1)

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

Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
m&eLanguageLearningPortal@CAS

[*updated 05.11.2025*]

# Business and Technical English 3

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| **Module name (EN): Business and Technical English 3** |
| **Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025 |
| **Module code:** BMT3504.EN3 |
| **Hours per semester week / Teaching method:**<br>1V+1U (2 hours per week) |
| **ECTS credits:**<br>2 |
| **Semester:** 5 |
| **Mandatory course:** yes |
| **Language of instruction:**<br>English |
| **Assessment:**<br>Written exam<br><br>[*updated 05.11.2025*] |
| **Applicability / Curricular relevance:**<br><br>BMT2504.EN3 (P213-0015) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, mandatory course<br>BMT3504.EN3 (P213-0249) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, mandatory course |
| **Workload:**<br>30 class hours (= 22.5 clock hours) over a 15-week period.<br>The total student study time is 60 hours (equivalent to 2 ECTS credits).<br>There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation. |
| **Recommended prerequisites (modules):**<br>None. |
| **Recommended as prerequisite for:** |
| **Module coordinator:**<br>Dr. Yuliya Stodolinska |
| **Lecturer:**<br>Dipl.-Übers. Eva Langenbahn<br><br>[*updated 25.09.2025*] |

**Learning outcomes:**
Note: The Business and Technical English 1, 2 and 3 modules are to be seen in conjunction with one another. They offer students a framework to further develop their English language skills in a professionally related area from the desired entry level B1 to level B2.

About the Business and Technical English 3 module: Students will learn to apply their English knowledge to the job application process. They will prepare application documents in English and develop strategies for interviews in general and in an intercultural context.
In a subject-specific context, students will learn to apply strategies for the general and detailed understanding of texts and learn to write technical manuals.

[*updated 05.11.2025*]

**Module content:**
Applying for a job
- Resume
- Job advertisements and cover letters
- Job interview

Technical Kontext
- Texts: General and detailed comprehension
- Writing technical manuals
- Understanding and explaining processes and procedures in biomedical engineering

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

[*updated 05.11.2025*]

**Teaching methods/Media:**
Teaching and learning materials for specific target groups (slides, audio, video, software)

[*updated 05.11.2025*]

**Recommended or required reading:**
The following materials are free of charge for students of the htw saar. We recommend their use for independent learning:

Susanne Ley, Christine Sick: prep course English
m&eLanguageLearningPortal@CAS (learning offer to help students learn English at the htw saar Alt-Saarbrücken campus, Niveau A1-B1)

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

Christine Sick, unter Mitarbeit von Lisa Rauhoff und Miriam Wedig (seit 2016): Online Extensions zu TechnoPlus Englisch, EUROKEY.
m&eLanguageLearningPortal@CAS

[*updated 05.11.2025*]

# Design Engineering and Materials Science

**Module name (EN): Design Engineering and Materials Science**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3304.KON

**Hours per semester week / Teaching method:**
5V (5 hours per week)

**ECTS credits:**
5

**Semester:** 3

**Mandatory course:** yes

**Language of instruction:**
German

**Assessment:**
Written exam 180 min.

[*updated 21.04.2026*]

**Applicability / Curricular relevance:**

BMT2304.KON (P213-0028) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 3, mandatory course
BMT3304.KON (P213-0231, P213-0232) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 3, mandatory course

**Workload:**
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 93.75 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Moritz Habschied

**Lecturer:** Prof. Dr. Moritz Habschied

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will be able to analyze the structure of technical

products and present it in the form of system, function and building structures, as well as technical drawings with different levels of abstraction. They will be familiar with the product development process and the methods to be applied there.

After successfully completing this module, students will be able to name the main groups of metallic and polymeric materials and their manufacturing processes.
Students will be able to explain the relationship between microstructure, manufacturing conditions, and material properties.
Students will be able to classify materials according to their areas of application.
Students will be able to analyze microstructures and derive mechanical properties from them.
Students will be able to assess the suitability of a material in a thermally stressed application.
Students will be able to determine suitable heat treatments for targeted property modification.

Students will demonstrate a willingness to work actively in groups.
Students will be able to organize group processes to solve technical problems.
Students will be able to reflect on contributions made by other group members and integrate them constructively.
Students will be able to justify their decisions regarding material selection with comprehensible factual arguments.
Students will be able to reflect on their own approach and adjust it if necessary.

Students will be able to conduct targeted research in specialist literature and databases.
Students will be able to compare researched data and evaluate its quality and relevance.

Students will be able to structure a subject topic in a meaningful way in terms of content and methodology.
Students will be able to present their results in a manner appropriate to the target audience using suitable media.
Students will be able to respond to critical questions in a well-founded manner.

[*updated 21.04.2026*]

**Module content:**
Design Technology
1 The technical product
 1.1 The product lifecycle
 1.2 The technical product from a customer´s perspective
 1.3 The technical product from a company´s perspective
 1.4.The product development process
2 Methodology of product development
 2.1 The product as a technical system
 2.2 Solving development problems
 2.3 General work methodology
 2.4 Conception - Developing and evaluating solutions
 2.5 Design - The basic rules of design
3 Technical drafting
 3.1 Depicting technical products
 3.2 Tolerances and fits
 3.3 Documenting technical products
4 Elements of technical products
 4.1 Joining techniques
 4.2 Pins, bolts, rivets, screws
 4.3 Technical springs
 4.4 Enclosure designs
 4.5 Rolling bearings and sliding bearings

Material Science
1. Structural description of materials
 1.1 Atomic structure and periodic table
 1.2 Types of bonds
 1.3 Structural descriptions of materials
 1.4 Lennard-Jones-potential energy & force-distance curve
 1.5 Introduction to crystallography
 1.6 Ideal crystals
  1.a. Excursus: Terms and definitions relevant to materials science in mechanics
  1.a.1 Force, stress, strain, elasticity, plasticity
  1.a.2 Relationship between normal stress and shear stress
 1.7 Lattice defects, their formation, and their significance for mechanical behavior (strength, deformation, etc.)
2. Mechanical material behavior (of metals)
 2.1 Elastic material behavior
 2.2 (Ideal) plastic material behavior
3. Mechanical materials testing
 3.1 Tensile testing (procedure, parameters, types of fracture, types of hardening curves, strain aging effects, hardening mechanisms, exercises)
 3.2 Charpy impact test (implementation, interpretation of results, influencing factors)
 3.3 Hardness testing (implementation of various test methods, evaluation, assessment, practical implementation instructions)
4. Alloy theory
 4.1 Phase diagram of single-component systems (e.g., water)
 4.2 Phase diagrams of two-component systems
 4.3 Lever rule, Gibbs phase rule
 4.4 Important types of (partial) phase diagrams
5. Iron-carbon diagram
 5.1 Phase description
 5.2 Microstructure development
6. Thermally activated processes / Manufacturing-related material influence
 6.1 Solidification mechanisms and ways to activate/deactivate them
 6.2 Diffusion
 6.3 Recovery, nucleation, seed growth, recrystallization
  6.4 Materials engineering: heat treatment process
  6.4.1 Phase transformations Austenite & cooling behavior --> Transformation diagrams
  6.4.2 Selected (thermal and thermochemical) heat treatment processes
7. Non-ferrous metals
 7.1 Aluminum alloys (natural hard & heat treatable) including process for precipitation hardening
 7.2 Magnesium alloys
 7.3 Titanium alloys
 7.4 Copper alloys
 7.5 Nickel alloys
7. Plastics
 7.1 Structural description & classification of plastics
 7.2 Plastic synthesis
 7.3 Chemical and physical properties
 7.4 Temperature-dependent mechanical behavior

[*updated 21.04.2026*]

**Teaching methods/Media:**
Lecture notes with additional learning material, subject-related visual aids, projector, blackboard

[*updated 21.04.2026*]

**Recommended or required reading:**
Bargel, Hans-Jürgen; Schulze, Günter: Werkstoffe, Springer, (akt. Aufl.)
Bergmann, Wolfgang: Werkstofftechnik Teil 1: Grundlagen, Hanser, (akt. Aufl.)
Decker, Karl-Heinz: Maschinenelemente, Hanser, (akt. Aufl.)
Ehrlenspiel, Klaus: Integrierte Produktentwicklung, Hanser, München, (akt. Aufl.)
Eigner, Martin; Stelzer, Ralph: Product Lifecycle Management, Springer, 2009, 2. Aufl.
Heine; Burkhard: Werkstoffprüfung, Fachbuchverlag Leipzig, 2011, 2. Aufl.
Hoenow, Gerhard; Meißner, Thomas: Entwerfen und Gestalten im Maschinenbau, Fachbuchverlag Leipzig, (akt. Aufl.)
Hoischen, Hans: Technisches Zeichnen, Cornelsen, Berlin, (akt. Aufl.)
Kurz, Ulrich; Wittel, Herbert: Böttcher/Forberg Technisches Zeichnen, Vieweg + Teubner, 2010, (akt. Aufl.)
Pahl, Gerhard; Beitz, Wolfgang: Konstruktionslehre - Methoden und Anwendung, Springer, Berlin, (akt. Aufl.)
Saatweber, Jutta: Kundenorientierung durch Quality Function Deployment, Symposion, Düsseldorf, 2007, 2. Aufl.

[*updated 21.04.2026*]

# Medical Economics

**Module name (EN): Medical Economics**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3602.ECO

**Hours per semester week / Teaching method:**
3V (3 hours per week)

**ECTS credits:**
3

**Semester:** 6

**Mandatory course:** yes

**Language of instruction:**
German

**Assessment:**
Exam

[*updated 30.04.2025*]

**Applicability / Curricular relevance:**

BMT2602.ECO (P213-0024) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 6, mandatory course
BMT3602.ECO (P213-0251) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 6, mandatory course

**Workload:**
45 class hours (= 33.75 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 56.25 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Robert Lemor

**Lecturer:** Prof. Dr. Robert Lemor

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will: be familiar with social risks and the basic

structures of social security that have developed as a result. They will be familiar with the central principles of the welfare state and social insurance, their financing bases, and the interaction between the various institutions involved. Students will have a common understanding of key terms relating to health, healthcare, and economics.

They will be familiar with the core services provided by statutory health, nursing care, accident, and pension insurance and understand the differences between statutory and private health insurance systems. Using the example of how the Joint Federal Committee works, students will have become familiar with which medical services are included in the fee schedule for doctors and thus in the catalog of services covered by health insurance, and which services are individual health services (IGeL) and must be financed privately. We will have discussed the effects of government intervention in the healthcare market using the example of co-payment regulations for various healthcare services.

Students will know key economic concepts and be familiar with the evaluation approach in healthcare. They will be familiar with the topic of strategic management by exploring the example of occupational health management (OHM) as a health economic approach. We will have addressed the process steps, the influence of leadership on health, and other content-related starting points for improving health indicators. We will have addressed the advantages and disadvantages of several analysis and evaluation tools.

Students will have calculated the economic efficiency of a CHM using assumed reduced continued sick pay costs and assumed reduced motivation losses.

Students will be familiar with supply chain management concepts and the basic ideas behind health technology assessments.

[*updated 30.04.2025*]

**Module content:**
1. Social risks, development, and challenges of social security in Germany and creating a common understanding of health and economics
2. Sources and pillars of social security, basic concepts of healthcare and social security, overview of social security financing principles
3. Core services provided by statutory health insurance and differences in financing compared to private health insurance, the healthcare market, and health-related indicators
4. Overview of relevant core benefits provided by statutory accident, long-term care, and pension insurance, and how to deal with gaps in coverage
5. Key economic concepts and evaluation in healthcare, strategic management using the example of occupational health management as a medical economic approach
6. Advantages and disadvantages of analysis and evaluation tools in occupational health management
7. Economic discussion on continued sick pay costs and loss of motivation, key economic concepts, and economic evaluation in healthcare
8. Concepts of supply chain management and supply chain networks
9. Insights into health technology assessment and exam preparation

[*updated 30.04.2025*]

**Recommended or required reading:**
Krapf, Manfred: Der deutsche Sozialstaat seit der Jahrhundertwende (gebundene Ausgabe) von der Reform nach 2000 bis zur Gegenwart, wbg Academic in der Verlag Herder GmbH, 2019, ISBN: 978-3-534-40132-1
Bernhard Badura: Betriebliche Gesundheitspolitik Der Weg zur gesunden Organisation, Springer, 2. Vollständig überarbeitete Auflage 2010, ISBN: 978-364204336

Badura, Ducky, Baumgardt, Meyer, Schröder (Hrsg.). Fehlzeitenreport 2023 Zeitenwende Arbeit gesund gestalten, 2023, ISBN: 978-3662675137

Chopra, Sunil; Meindl, Peter: Supply chain management: strategy, planning, and operation, Pearson, (akt. Aufl.)

Penter, Volker; Augurzky, Boris: Gesundheitswesen fu r Praktiker, Springer Gabler, 2014, ISBN 978-3658004149

Perleth, Matthias; Busse, Reinhard; Gerhardus, Ansgar u.a.: Health Technology Assessment: Konzepte, Methoden, Praxis fu r Wissenschaft und Entscheidungsfindung, Medizinisch-Wissenschaftliche Verlagsgesellschaft, (akt. Aufl.), ISBN 978-3941468719

[*updated 30.04.2025*]

# NeuroInsight: Fundamental Areas of Neurotechnology

**Module name (EN): NeuroInsight: Fundamental Areas of Neurotechnology**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3502.NIS

**Hours per semester week / Teaching method:**
4V+1P (5 hours per week)

**ECTS credits:**
5

**Semester:** 5

**Mandatory course:** yes

**Language of instruction:**
German

**Assessment:**
KL (50%), PPA (50%)

[*updated 21.04.2026*]

**Applicability / Curricular relevance:**

BMT3502.NIS (P213-0246, P213-0247) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, mandatory course

**Workload:**
75 class hours (= 56.25 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 93.75 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Dr. Daniel Strauß

**Lecturer:** Prof. Dr. Dr. Daniel Strauß

[*updated 07.08.2025*]

**Learning outcomes:**
In this module students will gain systematic insight into key topics in neural engineering. After successfully completing this module, they will have a basic understanding of brain-computer interfaces, neural and cognitive systems, and neural signal processing and modeling. They will have basic knowledge of signal

classes, signal transformations, and filter techniques, and will be proficient in fundamental methods for the practical processing of signals of neural origin in the context of neural engineering. In addition, they will be familiar with current research and development activities in the field of neural engineering.

[*updated 21.04.2026*]

**Module content:**
Fundamentals of the nervous system with a focus on information coding and functional organization, Properties of neuroelectric signals and basic methods for their detection, representation, and processing Introduction to neural and cognitive systems as information-processing structures, fundamentals of pattern recognition and AI: Feature extraction, simple classification principles, technical analogies to biological information processing processes, neural sources, functional patterns and their significance for modeling and neurotechnical applications, possibilities and limitations of neurotechnical measurement methods, and fundamental concepts of multimodal sensor integration, introduction to concepts of neural states and their functional role; Transfer of fundamental principles to AI-based systems, including empathic AI. Overview of current research and development activities in the field of neural engineering

[*updated 21.04.2026*]

**Recommended or required reading:**
D. S. Levine "Introduction to Neural and Cognitive Modeling", Lawrence Erlbaum Associates, 2000

Jorge Rosner "Peeling the Onion: Gestalt Theory and Methodology", Gestalt-Institute of Toronto, 1990

J. R. Evans and A. Abarbanel "Introduction to Quantitative EEG and Neurofeedback", Academic Press, 1999

E. N. Bruce "Biomedical Signal Processing and Signal Modelling", John Wiley & Sons, 2001

P. L. Nunez, R. Shrinivasan Electric Fields of the Brain "The Neurophysics of EEG", Oxford University Press, 2005

Z. W. Hall "Introduction to Molecular Neurobiology", Sinauer Associates Incorporated, 1992

J. Malmivuo und R. Plonsey "Bioelectromagnetism", Oxford University Press, 1999

M. Abeles "Corticonics: Neural Circuits of the Cerebral Cortex", Cambridge University Press, 1991

M. F. Bear, B. W. Connors und M. A. Paradiso "Neuroscience", Lippincott Williams and Wilkins, 2001

P. S. Churchland and T. J. Sejnowski "The Computational Brain", MIT Press, 1992

P. Dayan and L.F. Abbott "Theoretical Neuroscience", MIT Press, 2001

C. Eliasmith and Ch. H. Anderson "Neural Engineering", MIT Press, 2003

Ch. Koch "Biophysics of Computation", Oxford University Press, 1999

Akay, M. (Ed.): Time Frequency and Wavelets in Biomedical Signal Processing, IEEE Computer Society Press, 1997

Azizi, S.A.: Entwurf und Realisierung digitaler Filter, Oldenbourg, 1990

Bruce, Eugene N.: Biomedical Signal Processing and Signal Modeling, John Wiley & Sons, 2001

Mertins, A.: Signaltheorie, Springer Vieweg Wiesbaden, 1996

Oppenheim, Alan V.; Schafer, Ronald W.; Buck, John R.: Zeitdiskrete Signalverarbeitung, Oldenbourg, (akt. Aufl.)

Semmlow, John L.: Biosignal and Biomedical Image Processing, Marcel Dekker, 2004

Vetterli, Martin; Kovacevic, Jelena: Wavelets and Subband Coding, Prentice Hall, 1995

[*updated 21.04.2026*]

# Procedural Programming with C / C++

**Module name (EN): Procedural Programming with C / C++**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3305.PRG

**Hours per semester week / Teaching method:**
4V+2U (6 hours per week)

**ECTS credits:**
7

**Semester:** 3

**Mandatory course:** yes

**Language of instruction:**
German

**Assessment:**
Written exam

[*updated 08.01.2020*]

**Applicability / Curricular relevance:**

BMT2305.PRG (P211-0023) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 3, mandatory course
BMT3305.PRG (P213-0233) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 3, mandatory course
EE1302 (P211-0023) Energy system technology / Renewable energies, Bachelor, regulation 01.10.2022 , semester 3, mandatory course
E2305 (P211-0023) Electrical Engineering and Information Technology, Bachelor, regulation 01.10.2018 , semester 3, mandatory course, technical

**Workload:**
90 class hours (= 67.5 clock hours) over a 15-week period.
The total student study time is 210 hours (equivalent to 7 ECTS credits).
There are therefore 142.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Reinhard Brocks

**Lecturer:** Prof. Dr. Reinhard Brocks

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this course, students will be able to implement the concepts of procedural programming in the programming language C/C++. They will use design techniques to find solutions. They will use their knowledge about programming techniques to create well-structured and documented programs. They will use basic software development tools.

[*updated 08.01.2020*]

**Module content:**
- Procedural programming: fundamental data types, operators, control structures, functions, pointers and arrays, validity ranges and lifetime of objects, structures/unions, function pointers, command line arguments, references, namespaces - Design techniques: program flowchart - Programming techniques: modularization, separation of interface and implementation, callback functions, data structures and algorithms - Development tools: preprocessor, compiler, linker, shell, shell scripts, makefile, debugger

[*updated 08.01.2020*]

**Teaching methods/Media:**
Lecture notes

[*updated 08.01.2020*]

**Recommended or required reading:**
Dausmann, Manfred: C als erste Programmiersprache, Springer Vieweg, (akt. Aufl.) Erlenkötter, Helmut: C Progammieren von Anfang an, rororo Erlenkötter, Helmut: C++: Objektorientiertes Programmieren von Anfang an, rororo, (akt. Aufl.) Kernighan, Brian W.; Ritchie, Dennis M.: Programmieren in C, Hanser, 1990, 2. Ausg. ANSI C Stroustrup, Bjarne: Die C++ Programmiersprache, Addison-Wesley, (akt. Aufl.) Wolf, Jürgen: C von A bis Z, Galileo Press, Bonn, 2009, 2. Aufl., ISBN 978-3-8362-1429-2

[*updated 08.01.2020*]

# Signal and Systems Theory

**Module name (EN): Signal and Systems Theory**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT3405.SUS

**Hours per semester week / Teaching method:**
3V+1U (4 hours per week)

**ECTS credits:**
5

**Semester:** 4

**Mandatory course:** yes

**Language of instruction:**
German

**Assessment:**
Written exam

[*updated 08.01.2020*]

**Applicability / Curricular relevance:**

BMT.E2405 (P211-0025) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 4, mandatory course
BMT3405.SUS Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 4, mandatory course
E2405 (P211-0025) Electrical Engineering and Information Technology, Bachelor, regulation 01.10.2018 , semester 4, mandatory course, technical

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Martin Buchholz

**Lecturer:** Prof. Dr. Martin Buchholz

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this course, students will be able to grasp the abstract, system-theoretical relationships necessary for understanding how signals are transmitted in telecommunications systems. - They will be able to classify signals and systems and analyze properties such as linearity, time invariance, causality or stability. - They will be familiar with the procedure of folding for calculating systems in the time domain and be able to apply it to various examples. - Students will be able to explain the relationship between impulse response and frequency response. - They will be able to apply the Fourier transform to analyze signal processing systems in the frequency domain. - Students will be able to describe the relationships between Fourier and Laplace transforms and apply these transforms to IT systems. - They will be able to use the Laplace transform to calculate control systems in information technology (synchronization loops, amplifier control, adaptive filters). - Students will be able to calculate and outline the influences on signals and systems that arise when scanning to digitize signals. - They will understand the necessity of describing signals and systems with the complex baseband representation. - Students will have acquired the basics necessary for analog and digital signal processing, image processing, spectral analysis and communication technology.

[*updated 08.01.2020*]

**Module content:**
Our focus will be on system theoretical knowledge for the field of information technology 1. Introduction, signals and systems, terminology and definitions 2. Signal classification 3. Describing LTI systems in the time domain 4. Describing LTI systems in the frequency domain 5. Describing LTI systems using the Laplace transform 6. Discrete-time signals and systems 7. Representing complex signals

[*updated 08.01.2020*]

**Teaching methods/Media:**
Lecture notes, projector, MATLAB-SIMULINK, exercise sheets

[*updated 08.01.2020*]

**Recommended or required reading:**
Frey, Thomas; Bossert, Martin: Signal- und Systemtheorie, Vieweg + Teubner, (latest edition) Girod, Bernd; Rabenstein, Rudolf; Stenger, Alexander: Einführung in die Systemtheorie, Teubner, (latest edition) Lüke, Hans-Dieter; Ohm, Jens-Rainer: Signalübertragung - Grundlagen der digitalen und analogen Nachrichtenübertragungssysteme, Springer, (latest edition) Oppenheim, Alan V.; Willsky, Alan S.: Signale und Systeme: Lehrbuch, Wiley-VCH, 1991, 2. Aufl., ISBN 978-3527284337 Scheithauer, Rainer: Signale und Systeme, Teubner, 2005, 2. Aufl. Werner, Martin: Signale und Systeme: Lehr- und Arbeitsbuch mit MATLAB-ßbungen, Vieweg, 2005, 2. Aufl.

[*updated 08.01.2020*]

# Biomedical Engineering Bachelor - optional courses

## Brain-Computer Interface

**Module name (EN): Brain-Computer Interface**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2613.BCI

**Hours per semester week / Teaching method:**
1V+3PA (4 hours per week)

**ECTS credits:**
6

**Semester:** 6

**Mandatory course:** no

**Language of instruction:**
English/German

**Assessment:**
Project with presentation

[*updated 27.04.2021*]

**Applicability / Curricular relevance:**

BMT2613.BCI (P221-0183) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 6, optional course
BMT2613.BCI (P221-0183) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 6, optional course
KIB-BCI Computer Science and Communication Systems, Bachelor, regulation 01.10.2021 , optional course, informatics specific
KIB-BCI Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , optional course, informatics specific
MTM.BCI (P231-0128) Mechatronics, Master, regulation 01.04.2020 , optional course, technical
MST2.BCI Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2019 , optional course
MST2.BCI Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , optional course
PIB-BCI (P221-0183) Applied Informatics, Bachelor, regulation 01.10.2022 , optional course, informatics specific
PIB-BCI (P221-0183) Applied Informatics, Bachelor, regulation 01.10.2026 , optional course, informatics specific
TIB-BCI Technical Computer Science, Bachelor, regulation 01.10.2026 , optional course, informatics specific

Suitable for exchange students (learning agreement)

**Workload:**

60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 135 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Dr. Daniel Strauß

**Lecturer:** Prof. Dr. Dr. Daniel Strauß

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will be able to apply their basic knowledge about biosignal processing as it relates to movements of collaborative robots.

Based on their interdisciplinary knowledge of programming and biosignal processing, they will be able to solve simple tasks involving collaborative industrial robots and then record and interpret the relevant neural activity data and control the robot.

Students will be able to collaborate with students from other disciplines (BMT, Computer Science, Mechatronics) in their project assignments and in doing so, use different skills.

In addition to professional qualifications, students will have acquired experience in assuming professional and organizational responsibility within their (interdisciplinary) project team.

As study participants, students will have learned essential soft skills in dealing with subjects and patients.

[*updated 27.04.2021*]

**Module content:**
The basics of direct dialog between man and machine

Setting up experiments to measure and detect relevant patterns in human neural signals, in particular the electroencephalogram (EEG)

The interpretation and analysis of neural signals by means of signal processing and pattern recognition to control a robot

Simple programming of collaborative industrial robots

Handling robot hardware and system-dependent scripting language (based on UR as an example)

Implementing the control of the robot hardware based on interpreted data

[*updated 27.04.2021*]

**Teaching methods/Media:**
Lecture, practical exercises, workshop/training, meeting

[*updated 27.04.2021*]

**Recommended or required reading:**
Bruce, Eugene N.: Biomedical Signal Processing and Signal Modeling, John Wiley & Sons, 2001
Nunez, Paul L; Shrinivasan, Ramesh: Electric Fields of the Brain: the neurophysics of EEG, Oxford University Press, 1991

Semmlow, John L.: Biosignal and Biomedical Image Processing, Marcel Dekker, 2004
Clément, Claude. Brain-Computer Interface Technologies, Springer, 2019
http://www.i-botics.de/wp-content/uploads/2016/08/UR3_User_Manual_de_Global.pdf
https://www.universal-robots.com/download/?option=15833

[*updated 27.04.2021*]

# Classic Image Processing Algorithms with LabVIEW

**Module name (EN): Classic Image Processing Algorithms with LabVIEW**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2592.KBL

**Hours per semester week / Teaching method:**
2V+2U (4 hours per week)

**ECTS credits:**
5

**Semester:** 6

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Written exam 120 min. (50%), Project work (50%) with paper (20-30 pages)

[*updated 21.04.2026*]

**Applicability / Curricular relevance:**

BMT2592.KBL (P213-0273) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 6, optional course
E2514 (P213-0273) Electrical Engineering and Information Technology, Bachelor, regulation 01.10.2018 , semester 6, optional course

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Michael Kleer

**Lecturer:**
Marc Quirin, M.Sc.

[*updated 05.02.2026*]

**Learning outcomes:**
After successfully completing this module students will be able to solve classic image processing problems in a structured manner. They will have acquired the skills to process 2D images using LabVIEW software. Students will be able to explain theoretical methods using examples. They will be able to differentiate and interpret images based on their characteristics. This enables them to solve image processing problems methodically.

[*updated 21.04.2026*]

**Module content:**
1. Concepts for solving a classic image processing problem
1.1 Selection criteria for an image processing system
1.2 Possible computations
1.3 Image processing chain

2. Algorithms for the image processing chain
2.1 Mathematical tools
2.2 Preprocessing
2.2.1 Color models
2.2.2 Transformation functions
2.2.3 Local operators
2.2.4 Global operator (FFT)

2.3 Morphological operators
2.4 Segmentation
2.6. Extracting characteristics
2.7 Classification

3. Solutions and strategies for image processing tasks

[*updated 21.04.2026*]

**Teaching methods/Media:**
Blackboard, lecture notes, LabVIEW

[*updated 21.04.2026*]

**Recommended or required reading:**
Tönnies Klaus D.: Grundlagen der Bildverarbeitung, Addison-Wesley Verlag, 2005
Jähne B.: Digitale Bildverarbeitung. Springer, 5. Edition, 2002
Haberäcker Peter: Digitale Bildverarbeitung, Carl Hanser Verlag München Wien, 1987

[*updated 21.04.2026*]

# Cochlear Implants in Practice

**Module name (EN): Cochlear Implants in Practice**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2612.CI

**Hours per semester week / Teaching method:**
-

**ECTS credits:**
5

**Semester:** 6

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**

[*still undocumented*]

**Applicability / Curricular relevance:**

BMT2612.CI (P120-0357) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 6, optional course, medical/technical
BMT2612.CI (P120-0357) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 6, optional course, medical/technical

**Workload:**
The total student study time for this course is 150 hours.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Dr. Daniel Strauß

**Lecturer:** Prof. Dr. Dr. Daniel Strauß

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module students will be familair with the basics of pathophysiology, as well as the psychology and sociology of hearing impairment and the main strategies of communication with hearing impaired people. They will have an overview of the technical treatment options, especially surgical

therapy with a cochlear implant (CI). They will understand how important the subsequent adjustment of the CI is, as well as the methods used to do this.

[*updated 25.05.2021*]

**Module content:**
1. Pathophysiology of hearing (clinical aspects)
2. Psychology of hearing loss/deafness
3. Sociology of hearing impairment
4. Forms of communication
5. Treatment options for the hearing impaired
6. Surgical therapy for deafness
7. Adjusting the CI
8. Special forms of CI fitting and care
9. Professional requirements for the CI
10. Working with the hearing impaired
11. Follow-up care
12. If possible: a visit to watch a CI operation

[*updated 25.05.2021*]

**Teaching methods/Media:**
Blackboard, digital projector, software

[*updated 25.05.2021*]

**Recommended or required reading:**
M. Clark "Cochlear Implants" Springer, 2003
M. Clark "Introduction to Audiology", Allyn & Bacon, 2002

[*updated 25.05.2021*]

# Computer Networks

**Module name (EN): Computer Networks**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2551.RN

**Hours per semester week / Teaching method:**
2V+2P (4 hours per week)

**ECTS credits:**
5

**Semester:** according to optional course list

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Written exam

[*updated 26.02.2018*]

**Applicability / Curricular relevance:**

BMT2551.RN Biomedical Engineering, Bachelor, regulation 01.10.2018 , optional course, medical/technical
BMT2551.RN Biomedical Engineering, Bachelor, regulation 01.10.2025 , optional course, medical/technical
DFIW-RN (P610-0192) Computer Science and Web Engineering, Bachelor, regulation 01.10.2019 , semester 4, mandatory course
KIB-RN (P222-0037) Computer Science and Communication Systems, Bachelor, regulation 01.10.2021 , semester 3, mandatory course
KIB-RN (P222-0037) Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , semester 3, mandatory course
PIB-RN (P221-0038) Applied Informatics, Bachelor, regulation 01.10.2022 , semester 4, mandatory course
PIB-RN (P221-0038) Applied Informatics, Bachelor, regulation 01.10.2026 , semester 4, mandatory course
PRI-RN (P222-0037) Production Informatics, Bachelor, regulation 01.10.2023 , semester 3, mandatory course
PRI-RN (P222-0037) Production Informatics, Bachelor, regulation 01.10.2026 , semester 3, mandatory course

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Steffen Knapp

**Lecturer:** Prof. Dr. Steffen Knapp

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this course, students will be familiar with the functionality and data structures of the basic Internet protocol families between LAN and application level. They will be able to describe the communication in a TCP/IP computer network and use this knowledge for troubleshooting.

[*updated 26.02.2018*]

**Module content:**
1. Computer communication
1.1. Models
1.2. LAN
1.3. IP/ICMP
1.4. UDP
1.5. TCP

2. Selected application layer Internet protocols

3. Using network tools

[*updated 26.02.2018*]

**Recommended or required reading:**
Kurose, Ross, Computernetzwerke, Pearson, 2012
D. Comer, Computer Networks and Internets: Global Edition, Pearson, 2015

[*updated 26.02.2018*]

# Digital Skills for Engineers

**Module name (EN): Digital Skills for Engineers**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2552.DSI

**Hours per semester week / Teaching method:**
2V+2P (4 hours per week)

**ECTS credits:**
5

**Semester:** 5

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Oral examination

[*updated 09.11.2022*]

**Applicability / Curricular relevance:**

BMT2552.DSI (P213-0187) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, optional course
BMT2552.DSI (P213-0187) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, optional course
EE1536 (P213-0187) Energy system technology / Renewable energies, Bachelor, regulation 01.10.2022 , semester 5, optional course, category 2
E2586 (P213-0187) Electrical Engineering and Information Technology, Bachelor, regulation 01.10.2018 , semester 5, optional course
MAB_19_4.2.1.35 (P213-0187) Mechanical and Process Engineering, Bachelor, regulation 01.10.2019 , semester 5, optional course

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Andreas Schaffhauser, M.Sc.

**Lecturer:** Andreas Schaffhauser, M.Sc.

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will be able to apply the basic digital skills they need as an engineer in their job. They will have developed their problem-solving skills by analyzing and developing solutions for subject-related problems in exercises. They will have developed their communication skills by presenting and discussing their individual solutions in plenary.

They will be able to consider the concepts, as well as the advantages and disadvantages of simple and complex data management mechanisms when applied to unfamiliar case studies.

Students will be able to transfer data sets into the respective data formats after having practiced this within the framework of practical exercises. They will be able to transform datasets into the appropriate forms using normalization rules. They will be able to store and manage transformed datasets in a database management system.

They will be able to apply the concepts of automation in common office applications to independently learn how to automate spreadsheets and text documents and solve simple problems on their own.

They will be able to identify the different advantages and disadvantages of local, centralized and decentralized versioning systems. They will be able to apply concepts for effective source code management and versioning. They will be able to practice the process of versioning with source code that they have implemented themselves.

Students will be able to identify theoretical points of attack of an IT system. They will be able to describe possible measures to protect IT systems from these points of attack by practicing this on two topics.

[*updated 04.09.2023*]

**Module content:**
1 Introduction to Digital Skills für Ingenieure
1.1 Presentation of Future & Digital Skills competencies (technical, non-technical,...)
1.2 Raising awareness for non-technical competencies

2 Data formats
2.1 CSV
2.2 JSON
2.3 XML

3 (Relational) databases
3.1 CSV/Excel vs. databases
3.2 Structure of a DBMS (database system)
3.2.1 Data dictionary
3.2.2 Databases/Tables
3.2.3 DBMS (Database Management System)
3.2.4 Referential integrity
3.2.5 ACID
3.3 Database languages/SQL
3.3.1 Select statement
3.3.2 Joins
3.4 Development of a database schema
3.4.1 Specialist concept
3.4.2 Data processing concept

3.4.3 Implementation level
3.5 Specialist concept
3.6 Data processing concept
3.6.1 Model development
3.6.2 Chen Notation/ER model
3.6.3 Operations, relational algebra (projection, selection, ...)
3.6.4 Term relations
3.6.5 Normalization

4 Programming macros
4.1 Introduction to IDE
4.2 Variable types and declarations
4.3 Hungarian notation
4.4 Notation used in the lecture (UpperCamelCase)
4.5 Subroutines
4.6 Functions
4.7 Parameter transfer (Call by Reference/Call by Value)
4.8 Operators
4.9 Sequence control
4.10 Error handling with GoTo
4.11 Access to text documents
4.12 Access to tables

5 Version control
5.1 History versioning
5.2 Local/centralized/distributed version control
5.3 Git
5.3.1 The three states of Git
5.3.2 Initializing a repository
5.3.3 .gitignore (Using templates for ignoring files)
5.3.4 README.md (Header, applications etc.)
5.3.5 Basic commands
5.3.6 Branches

6 Current IT security topics
6.1 Information security
6.2 CIA triad
6.3 Safety
6.4 Threats
6.4.1 Malware
6.4.2 Ransomware
6.4.3 Social engineering
6.4.4 Advance persistent threat
6.4.5 Denial of service

[*updated 04.09.2023*]

**Teaching methods/Media:**
- Interfaces for programming applications for the respective tools
- Openly accessible teaching materials for the respective subject areas

All teaching materials and exercises are available from the instructor.

[*updated 09.11.2022*]

**Recommended or required reading:**
- Future Skills 2021 - 21 Kompetenzen für eine Welt im Wandel (https://www.stifterverband.org/download/file/fid/10547)
- Common Format and MIME Type for Comma-Separated Values (CSV) Files (https://datatracker.ietf.org/doc/html/rfc4180)
- The JavaScript Object Notation (JSON) Data Interchange Format (https://datatracker.ietf.org/doc/html/rfc8259)
- Extensible Markup Language (XML) 1.0 (Fifth Edition) (https://www.w3.org/TR/REC-xml/)
- Database system basics: Bachelor
- XAMPP (https://www.apachefriends.org/de/index.html)
- Pro Git (https://github.com/progit/progit2-de/releases/download/2.1.215/progit.pdf)

[*updated 02.12.2025*]

# Engineering Design Methodology

**Module name (EN): Engineering Design Methodology**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2410.KON

**Hours per semester week / Teaching method:**
2V+2PA (4 hours per week)

**ECTS credits:**
4

**Semester:** according to optional course list

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**

[*updated 23.09.2025*]

**Applicability / Curricular relevance:**

BMT2410.KON (P213-0195) Biomedical Engineering, Bachelor, regulation 01.10.2018 , optional course
BMT2410.KON (P213-0195) Biomedical Engineering, Bachelor, regulation 01.10.2025 , optional course

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 120 hours (equivalent to 4 ECTS credits).
There are therefore 75 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Andrea Bohn

**Lecturer:** Prof. Dr. Andrea Bohn

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will be able to analyze the function of technical products and model the structure of technical systems. They will be familiar with and proficient in the entire product

development process and will be able to shape its key phases by adapting the general methods used in these phases to the development of biomedical products.

[*updated 23.09.2025*]

**Module content:**
1 Product lifecycle
2 Product development process
3 Product development
  3.1 Project definition process
  3.2 Concept process
  3.3 Design process
  3.4 Preparation process

[*updated 23.09.2025*]

**Recommended or required reading:**
Bender, B.; Gericke, K.: Pahl/ Beitz Konstruktionslehre.
9. Auflage. Wiesbaden: Springer Vieweg, 2020
VDI 2221 Blatt 1:2019-11: Entwicklung technischer Produkte und Systeme Modell der Produktentwicklung.
Berlin: Beuth-Verlag, 2019

[*updated 23.09.2025*]

# Fundamentals of 3D Design using Inventor

**Module name (EN): Fundamentals of 3D Design using Inventor**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2521.INV

**Hours per semester week / Teaching method:**
2V+2U (4 hours per week)

**ECTS credits:**
5

**Semester:** according to optional course list

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Written exam 120 min.

[*updated 06.11.2020*]

**Applicability / Curricular relevance:**

BMT2521.INV (P231-0104) Biomedical Engineering, Bachelor, regulation 01.10.2018 , optional course, technical
BMT2521.INV (P231-0104) Biomedical Engineering, Bachelor, regulation 01.10.2025 , optional course, technical
MST.INV (P231-0104) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2012 , optional course, technical
MST.INV (P231-0104) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2019 , optional course, technical
MST.INV (P231-0104) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , optional course, technical
MST.INV (P231-0104) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2011 , optional course, technical

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Bernd Heidemann

**Lecturer:** Prof. Dr. Bernd Heidemann

[*updated 29.11.2024*]

**Learning outcomes:**

After successfully completing this course, students will be familiar with the basic structure and functions of a complex 3-D CAD system.
Students will be able to model 3D parts, assemblies and complex assemblies in a structured manner, as well as derive complex 2D drawings, views and sections and generate parts lists.

[*updated 06.11.2020*]

**Module content:**
- Introduction to the Inventor work environment
- Creating and managing projects
- Introduction to the new Inventor interface
- Sketch geometry
- Creating and editing parametric components via extrusion, rotation, etc.
- Determining 2-D dependencies
- Placed features: Fillets, chamfers, holes, threads, shells, rectangular patterns, circular patterns, mirrored features
- Work features: Work planes, work points, work axes
- Assembly design (assemblies) with 3D dependencies
- Moving and animating components
- Sections in assembly animations
- Creating presentation views and defining exploded views, predefined camera positions
- Deriving 2-D drawings from component, assembly and presentation drawings
- Creating assistant dimensions, centerlines, and bills of materials, hole notes, etc..
- Drawing output via plotter/printer

[*updated 06.11.2020*]

**Teaching methods/Media:**
Seminaristic instruction at the computer workstation with projector and integrated exercises

[*updated 06.11.2020*]

**Recommended or required reading:**
Armin Gräf: Inventor 2010 Basiskurs, PowerCAD Verlag
Günter Scheuermann: Inventor 2010 (Bauteile, Baugruppen, Zeichnungen), Hanser-Verlag

Script Inventor 2010: Grundlagen mit Übungen

[*updated 06.11.2020*]

# Kinematic Principles of Robotics

**Module name (EN): Kinematic Principles of Robotics**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2505.KGR

**Hours per semester week / Teaching method:**
3V+1U (4 hours per week)

**ECTS credits:**
5

**Semester:** 5

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**

[*updated 19.12.2023*]

**Applicability / Curricular relevance:**

BMT2505.KGR (P221-0197) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, optional course
BMT2505.KGR (P221-0197) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, optional course
E2588 (P221-0197) Electrical Engineering and Information Technology, Bachelor, regulation 01.10.2018 , semester 5, optional course
KIB-KGR (P221-0197) Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , semester 5, optional course
MAB_19_4.2.1.39 (P221-0197) Mechanical and Process Engineering, Bachelor, regulation 01.10.2019 , semester 5, optional course
MST2.KGR (P221-0197) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , semester 5, optional course
PIB-KGR (P221-0197) Applied Informatics, Bachelor, regulation 01.10.2022 , semester 5, optional course
PIB-KGR (P221-0197) Applied Informatics, Bachelor, regulation 01.10.2026 , semester 5, optional course
PRI-KGR (P221-0197) Production Informatics, Bachelor, regulation 01.10.2023 , semester 5, optional course
PRI-KGR (P221-0197) Production Informatics, Bachelor, regulation 01.10.2026 , semester 5, optional course
TIB-KGR Technical Computer Science, Bachelor, regulation 01.10.2026 , semester 5, optional course

**Workload:**
60 class hours (= 45 clock hours) over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 105 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Michael Kleer

**Lecturer:** Prof. Dr. Michael Kleer

[*updated 29.11.2024*]

**Learning outcomes:**
Students will be able to demonstrate and apply the most important methods for describing and calculating robot systems. They will be able to independently explain and calculate the interaction of robot systems with several coordinate systems and the associated coordinate transformations in detail. In addition, students will be able to independently calculate the forward and inverse kinematics of typical industrial robots and solve path and trajectory planning tasks.

[*updated 19.12.2023*]

**Module content:**
1. Classifying robot workspaces
2. Principles of rotations, transformations, coordinate system representations
3. Introduction to homogeneous transformations
4. Introduction to the Denavit-Hartenberg transformation method
5. Forward and inverse kinematics of serial robots
6. Basics of the Jacobian matrix
7. The fundamentals of path and trajectory planning

[*updated 19.12.2023*]

**Recommended or required reading:**
Springer Handbook of Robotics, https://doi.org/10.1007/978-3-540-30301-5
Robot Modeling and Control, ISBN: 978-1-119-52404-5

[*updated 19.12.2023*]

# Machine Learning and Deep Learning in Medicine

**Module name (EN): Machine Learning and Deep Learning in Medicine**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2524.MLM

**Hours per semester week / Teaching method:**
2S (2 hours per week)

**ECTS credits:**
3

**Semester:** 5

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Seminar

[*updated 21.10.2024*]

**Applicability / Curricular relevance:**

BMT2524.MLM (P213-0207) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, optional course
BMT2524.MLM (P213-0207) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, optional course

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 67.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Robert Lemor

**Lecturer:** Prof. Dr. Robert Lemor

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will:

1. Have a basic understanding of the concepts and methods of machine learning and deep learning in relation to medicine.
2. Be able to analyze and evaluate scientific literature.
3. Be familiar with current research approaches and applications of ML and DL in medicine.
4. Be able to present complex scientific work clearly and concisely.
5. Be able to hold critical discussions about the advantages and disadvantages of ML and DL methods in a medical context.

[*updated 21.10.2024*]

**Module content:**
Machine learning (ML) and deep learning (DL) have made significant progress in recent years and are increasingly being applied in medicine. These technologies offer promising opportunities for improving diagnostic accuracy, developing personalized therapies, and optimizing clinical workflows. The seminar Machine Learning and Deep Learning in Medicine aims to give students in-depth insight into the current research developments and applications of these technologies in the medical field.

The seminar begins with an introduction by the lecturer to the terminology and methodology of machine learning and deep learning. After that, the participants will present and discuss individual research papers from current literature.

Represented by the lecturer:
- Definition and basics of machine learning and deep learning
- Overview of applications in the medical field
- Methodological principles and technical requirements

Presentations and discussions by and with the participants:
Each participant selects a current research paper from the bibliography provided and prepares a presentation. The presentations should cover the following points:
- Research goals
- Methodology and the algorithms used
- Results and their interpretation
- Critical evaluation of the study

List of some possible topics (based on the bibliography provided):
1. Diagnosis of diseases: using ML/DL to detect diseases such as cancer, cardiovascular diseases, diabetes.
2. Image processing and radiology: using DL to analyze medical images such as X-rays, MRIs, and CT scans.
3. Genomics and personalized medicine: applying ML/DL to analyze genomic data and develop personalized treatment plans.
4. Prognosis and prediction models: developing models to predict the progress of diseases and treatment outcomes.
5. Robotics and surgery: using ML to support and automate surgical procedures.
6. Electronic health records (EHRs): analyzing EHR data to improve clinical decision making.
7. Natural Language Processing (NLP) in medicine: processing and analyzing medical texts and records.

[*updated 21.10.2024*]

**Recommended or required reading:**
A detailed bibliography will be provided at the beginning of the seminar.
Important sources include:
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). "Deep Learning". MIT Press.
- Esteva, A., Robicquet, A., Ramsundar, B., et al. (2019). "A guide to deep learning in healthcare". Nature

Medicine, 25(1), 24-29.
- Lundervold, A. S., & Lundervold, A. (2019). "An overview of deep learning in medical imaging focusing on MRI". Zeitschrift für Medizinische Physik, 29(2), 102-127.

[*updated 21.10.2024*]

# Mentoring

**Module name (EN): Mentoring**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2590.MEN

**Hours per semester week / Teaching method:**
2S (2 hours per week)

**ECTS credits:**
2

**Semester:** 5

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Seminar paper

[*updated 19.02.2018*]

**Applicability / Curricular relevance:**

BMT2590.MEN (P200-0018) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, optional course
BMT2590.MEN (P200-0018) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, optional course
KI591 (P200-0018) Computer Science and Communication Systems, Bachelor, regulation 01.10.2014 , semester 5, optional course, non-technical
KIB-MENT (P200-0018) Computer Science and Communication Systems, Bachelor, regulation 01.10.2021 , semester 5, optional course, non-technical
KIB-MENT (P200-0018) Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , semester 5, optional course, non-technical
MAB.4.2.1.15 (P200-0018) Mechanical and Process Engineering, Bachelor, regulation 01.10.2013 , semester 3, optional course
PIBWN39 Applied Informatics, Bachelor, regulation 01.10.2011 , semester 5, optional course, not informatics specific
PIB-MENT (P200-0018) Applied Informatics, Bachelor, regulation 01.10.2022 , semester 5, optional course, not informatics specific
PIB-MENT (P200-0018) Applied Informatics, Bachelor, regulation 01.10.2026 , semester 5, optional course, not informatics specific
PRI-MENT (P200-0018) Production Informatics, Bachelor, regulation 01.10.2023 , semester 5, optional course, not informatics specific
PRI-MENT (P200-0018) Production Informatics, Bachelor, regulation 01.10.2026 , semester 5, optional course, not informatics specific
TIB-MENT Technical Computer Science, Bachelor, regulation 01.10.2026 , semester 5, optional course, non-technical

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Sandra Wiegand, M.A.

**Lecturer:** Sandra Wiegand, M.A.

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, the students will have acquired the following competences:
- They will know, understand and be able to explain the structure of mentoring programs
- They will know and understand theories of conversation techniques and be able to apply them during consultations
- They will be able to plan and conduct consultations and group discussions
- They will be able to reflect upon and optimize their consulting competences
- They will be able to build new networks

(Text form: In addition to teaching the history, structure and background of mentoring programs in general, this course is intended help students become familiar with the university´s internal mentoring program. Students will get to know different theories of conversation and practice using them. By means of different methods, students will learn to reflect upon and optimize their own consulting skills. For the duration of one semester, students will support a group of 6-10 other students via group work and individual counselling. Through regular inter-faculty meetings, students will establish new networks.

[*updated 19.02.2018*]

**Module content:**
- Definition, history and background of mentoring programs in the USA and Europe
- Structure and course of the HTW mentoring program
- Theories in conversation management
- Theories about group dynamics
- Non-verbal communication
- Schulz von Thun communication model
- Constructive criticism
- Giving feedback
- Active listening
- Assuming roles
- Planning, structuring and recording consultations and group discussions

[*updated 19.02.2018*]

**Teaching methods/Media:**
Worksheets and guidelines for the course and presentations, slide handouts, work in small groups, role

playing

[*updated 26.02.2018*]

**Recommended or required reading:**

Deutsches Jugendinstitut e.V. (Hrsg.) (1999): Mentoring für Frauen. Eine Evaluation verschiedener Mentoring Programme. München.

Haasen, Nele (2001): Mentoring. Persönliche Karriereförderung als Erfolgskonzept. München.

Heinze Christine (2002): Frauen auf Erfolgskurs. So kommen Sie weiter mit Mentoring. Freiburg.

Krell, Gertraude (Hrsg.) (1997): Chancengleichheit durch Personalpolitik,Wiesbaden

[*updated 19.02.2018*]

# Methods in Radiology

| |
|---|
| **Module name (EN): Methods in Radiology** |
| **Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025 |
| **Module code:** BMT2614.RAD |
| **Hours per semester week / Teaching method:**<br>1V+1P (2 hours per week) |
| **ECTS credits:**<br>2 |
| **Semester:** 6 |
| **Mandatory course:** no |
| **Language of instruction:**<br>German |
| **Assessment:**<br>Oral examination<br><br>[*updated 05.06.2025*] |
| **Applicability / Curricular relevance:**<br><br>BMT611 Biomedical Engineering, Bachelor, regulation 01.10.2011 , semester 6, optional course<br>BMT1612 Biomedical Engineering, Bachelor, regulation 01.10.2013 , optional course, medical/technical<br>BMT2614.RAD (P213-0040) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 6, optional course<br>BMT2614.RAD (P213-0040) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 6, optional course |
| **Workload:**<br>30 class hours (= 22.5 clock hours) over a 15-week period.<br>The total student study time is 60 hours (equivalent to 2 ECTS credits).<br>There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation. |
| **Recommended prerequisites (modules):**<br>None. |
| **Recommended as prerequisite for:** |
| **Module coordinator:**<br>Prof. Dr. Dr. Dirk Pickuth |
| **Lecturer:** Prof. Dr. Dr. Dirk Pickuth<br><br>[*updated 29.11.2024*] |

**Learning outcomes:**
After successfully completing this module, students will have detailed knowledge of imaging techniques, from their technology to their application. They will have an excellent command of the physical basics, the technical concepts and the medical application of imaging procedures. They will be familiar with the indications and contraindications for the application of these procedures and can assess their advantages and disadvantages. All projection and sectional imaging techniques will be considered, with a focus on radiography, mammography, and angiography, as well as magnetic resonance imaging, computed tomography, and sonography. Students will have an understanding of the possibilities of medical information processing and communication.

[*updated 05.06.2025*]

**Module content:**
- Radiography
SI units in radiology Types of radiation Interaction of radiation with matter Attenuation law Attenuation factors Phases of radiation effects X-ray workstation Structure of the X-ray tube Electrical circuits of the X-ray tube Characteristics of the X-ray tube Origin of X-ray radiation Properties of X-ray radiation Hard beam technology Soft beam technology Automatic exposure Exposure measuring chambers Heel effect Intensifying screen and blurring X-ray film Optical density Geometric blurring Scattered radiation Scatter grid Perpendicular beam Central beam Superposition Edge effect Enlargement Isometry Parallax Distortion inverse square law digital radiography systems characteristics of digital radiography image processing in digital radiography flat panel detectors image plates digital luminescence radiography CCD systems tomography fluoroscopy workstation image intensifier tube quality assurance film processing sensitometer X-ray contrast media chest workstation chest overview image decentration, defocusing anatomy of the chest posterior-anterior chest image lateral chest image anatomy of the joint double contrast examination of the stomach small intestine passage according to Sellink colon contrast enema example findings phlebography

- Mammography
Anatomy of the breast - Mammography device - Mammography consultation hour - Recording technique - Radiation path - Adjustment criteria - Conventional mammography - Digital mammography - Conventional mammography compared to digital mammography - Importance of compression - Quality criteria - Minimization of blur - Normal findings - Involution - Criteria for findings - Malignancies in mammography - Galactography - Malignancies in galactography - Devices for stereotaxy - Principle of vacuum assisted biopsies

- Angiography
Angiography workstation Device elements Puncture site Puncture technique Catheter placement Contrast agent injection Patient examination Image post-processing Digital subtraction angiography Generation of a DSA image Digital subtraction angiography compared to conventional angiography Image evaluation Overview angiography Selective angiography Vessel closure Intervention in case of vessel closure

- Magnetic resonance imaging
Magnetic resonance imaging - Coils - Structure of a MRI scanner - Contraindications - Terminology and sequences - K-space - Measurement parameters - Image contrast - Signal intensities - Examination parameters - Artefacts - MR angiography - Stroke diagnostics - Tumor diagnostics - Metastasis diagnostics - Special sequences - Image fusion - Tumor progress monitoring - Tumor volumetry - MRT compared to PET

- Computer tomography
Computer tomography scanner - Mobile computer tomography scanner - Installation plan - Computer tomography accessories - Structure of a computer tomography scanner - Basic principles of CT - Principles of CT scanning - Principles of spiral CT - Spiral CT compared to incremental CT - Principles of multi-layer spiral CT - Detector configuration - Multi-layer CT in comparison to single layer spiral CT - Pitch factor -

Influence of scan parameters on patient dose - Principles of CT image reconstruction - Pixels and voxels - Windowing - Hounsfield units - CT applications - Special CT applications - Artefacts - Test points for constancy testing - Whole body scintigraphy - Whole body CT - GK-CT compared to GK-MRT - Whole body CTA - GK-CTA compared to GK-MRA - Image display - CT of the heart and coronary vessels - Three-dimensional transparency - Catheter-like display - Multiplanar reformation - Volume rendering and MPR - CTA of the entire arterial flow path - CTA of renal vessels - CTA of pelvic vessels - CTA of leg vessels - CTA of foot vessels - CTA after intervention - Virtual colonoscopy - High resolution CT - Bronchial CT - Tumor imaging - Metastasis imaging - Trauma diagnostics - Three-dimensional imaging - Therapy planning - Functional diagnostics

- Sonography
Principal of sonography - Types of transducers - Transducer design - Sound field - Sound attenuation - Harmonic imaging - Standard sections - Convex scanner

[*updated 05.06.2025*]

**Recommended or required reading:**
Dössel, 0.: Bidgebende Verfahren in der Medizin
Kramme: Medizintechnik
Laubenberger, Th.; Laubenberger, J.: Technik der medizinischen Radiologie
Pickuth, D.: Klinische Radiologie Fakten
Rybach, J.: Physik für Bachelors

[*updated 05.06.2025*]

# Oral and General Presentation Skills in the Engineering Sciences

**Module name (EN): Oral and General Presentation Skills in the Engineering Sciences**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2581.RPR

**Hours per semester week / Teaching method:**
2V (2 hours per week)

**ECTS credits:**
2

**Semester:** according to optional course list

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Final presentation on a technical topic (5  7 mins.)

[*updated 05.06.2025*]

**Applicability / Curricular relevance:**

BMT1581 (P200-0019) Biomedical Engineering, Bachelor, regulation 01.10.2013 , optional course, non-medical/technical
BMT2581.RPR (P200-0019) Biomedical Engineering, Bachelor, regulation 01.10.2018 , optional course, non-medical/technical
BMT2581.RPR (P200-0019) Biomedical Engineering, Bachelor, regulation 01.10.2025 , optional course, non-medical/technical
E211 (P200-0019) Electrical Engineering, Bachelor, regulation 01.10.2005 , semester 2, optional course, non-technical
E1581 (P200-0019) Electrical Engineering, Bachelor, regulation 01.10.2012 , optional course, non-technical

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Dr. Peter Ludwig

**Lecturer:** Dr. Peter Ludwig

[*updated 29.11.2024*]

**Learning outcomes:**
In this course, students will be introduced to the basics of rhetoric and presentation for technical professions and will be individually coached with regard to their verbal and non-verbal communication. The course is very practice and training-oriented. It offers a mixture of lectures, individual and team work and targeted individual training.

After successfully completing this course, students will have deepened, consolidated and expanded the following skills:
* Finding/strengthening their own style of communication
* Structuring and coordinating information
* Developing/strengthening their own rhetorical skills
* Assessing communication partners and situations
* Giving and receiving feedback
* Using presentation techniques effectively

[*updated 05.06.2025*]

**Module content:**
1. Principles of rhetoric and presentation
2. Planning a presentation (organization/check list)
3. Content concept (order/structuring information)
4. Rhetorical practice (stylistic devices/argumentation strategies)
5. Visualization concept (working with media, designing slides)
6. Procedure (structure, phase structure)
7. Individual training (promotion of verbal and non-verbal communication)
8. Dealing with disruptions (dealing with disruptions and conflicts)

[*updated 05.06.2025*]

**Recommended or required reading:**
Fey H. u. G.: Sicher und überzeugend präsentieren. Walhalla 1998
Lackner T.: Die Schule des Sprechens. Rhetorik und Kommunikationstraining. Öbv & Hpt, 2000.
Schulz von Thun F., Ruppel J., Stratmann R.: Miteinander reden.
Kommunikationspsychologie für Führungskräfte. Rowohlt 2003.

[*updated 05.06.2025*]

# Oral Presentation Skills

**Module name (EN): Oral Presentation Skills**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2591.RPR

**Hours per semester week / Teaching method:**
2S (2 hours per week)

**ECTS credits:**
2

**Semester:** according to optional course list

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Presentation

[*updated 23.09.2025*]

**Applicability / Curricular relevance:**

BMT2591.RPR (P222-0038) Biomedical Engineering, Bachelor, regulation 01.10.2018 , optional course
BMT2591.RPR (P222-0038) Biomedical Engineering, Bachelor, regulation 01.10.2025 , optional course
EE-K2-554 (P222-0038) Energy system technology / Renewable energies, Bachelor, regulation 01.04.2015 , optional course
E2587 (P222-0038) Electrical Engineering and Information Technology, Bachelor, regulation 01.10.2018 , optional course
KIB-RP (P222-0038) Computer Science and Communication Systems, Bachelor, regulation 01.10.2021 , optional course, not informatics specific
KIB-RP (P222-0038) Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , optional course, not informatics specific
MAB_19_4.2.1.36 (P222-0038) Mechanical and Process Engineering, Bachelor, regulation 01.10.2019 , optional course
MST.RPR (P222-0038) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , optional course, non-technical
PIB-RP (P222-0038) Applied Informatics, Bachelor, regulation 01.10.2022 , optional course, not informatics specific
PIB-RP (P222-0038) Applied Informatics, Bachelor, regulation 01.10.2026 , optional course, not informatics specific
TIB-RP Technical Computer Science, Bachelor, regulation 01.10.2026 , optional course, not informatics specific

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Studienleitung

**Lecturer:** Studienleitung

[*updated 29.11.2024*]

**Learning outcomes:**
Communication skills are now considered fundamental to technology-oriented professional practice and personal development.

In this course, students will be introduced to the basics of rhetoric and presentation for technical professions. Individual coaching will promote students verbal and nonverbal communication skills and strengthen their personal development. This module is highly practice and training-oriented. It offers a mixture of lectures, individual and team work tasks and targeted individual training.

After successfully completing this course, students will have deepened, consolidated and expanded the following competences:
* Finding/strengthening their own style of communication
* Structuring and coordinating technical and target group-specific information
* Developing/consolidating their own rhetorical and presentation skills
* Assessing communication partners and situations
* Giving and receiving feedback
* Using presentation techniques effectively

[*updated 23.09.2025*]

**Module content:**
1. Principles of rhetoric and presentation
2. Planning a presentation (organization/check list)
3. Content concept (order/structuring information)
4. Rhetorical practice (stylistic devices/argumentation strategies)
5. Visualization concept (working with media, designing slides)
6. Procedure (structure, phase structure)
7. Video- assisted individual training (promotion of verbal and non-verbal communication)
8. Dealing with disruptions (dealing with disruptions and conflicts)

[*updated 23.09.2025*]

**Recommended or required reading:**
No specific reading knowledge is required for this module. Regular attendance and willingness to train are however important.

Background information is provided in a number of selected publications:

Fey H. u. G.: Sicher und überzeugend präsentieren. Walhalla 1998
Lackner T.: Die Schule des Sprechens. Rhetorik und Kommunikationstraining. Öbv & Hpt, 2000.

[*updated 23.09.2025*]

# Preparing for the IELTS Test

**Module name (EN): Preparing for the IELTS Test**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2640.IELTS

**Hours per semester week / Teaching method:**
2VU (2 hours per week)

**ECTS credits:**
2

**Semester:** 6

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Written exam (75%), oral examination (25%)

[*updated 05.10.2020*]

**Applicability / Curricular relevance:**

BMT2640.IELTS (P213-0041) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 6, optional course
BMT2640.IELTS (P213-0041) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 6, optional course
KIB-IEL Computer Science and Communication Systems, Bachelor, regulation 01.10.2021 , semester 6, optional course, non-technical
KIB-IEL Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , semester 6, optional course, non-technical
MAB_19_2.1.2.24 (P213-0041) Mechanical and Process Engineering, Bachelor, regulation 01.10.2019 , optional course, general subject
MST.IEL (P200-0023, P213-0041, P231-0133) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2012 , semester 6, optional course
MST.IEL (P200-0023, P213-0041, P231-0133) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2019 , semester 6, optional course
MST.IEL (P200-0023, P213-0041, P231-0133) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , semester 6, optional course
PIB-IEL Applied Informatics, Bachelor, regulation 01.10.2022 , semester 6, optional course, not informatics specific
PIB-IEL Applied Informatics, Bachelor, regulation 01.10.2026 , semester 6, optional course, not informatics specific
PRI-IEL Production Informatics, Bachelor, regulation 01.10.2023 , semester 6, optional course
TIB-IEL Technical Computer Science, Bachelor, regulation 01.10.2026 , semester 6, optional course, non-technical

Suitable for exchange students (learning agreement)

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Dr. Yuliya Stodolinska

**Lecturer:** Dr. Yuliya Stodolinska

[*updated 29.11.2024*]

**Learning outcomes:**
Note:
The module is geared towards Bachelor and Master students in engineering who require the language test IELTS (International English Testing System), Volume 6.5, for admission to a Master´s program or as part of an application for a stay abroad and wish to prepare for it.

The module ends with an examination based on the format of the IELTS test. The examination consists of a written part (75%) on listening comprehension, reading comprehension and writing and an oral exam (25%). Each part must be passed with at least 40%.

The actual IELTS test must be taken at a certified IELTS test center

About this module:
Students will become familiar with the format, structure (reading, listening, writing and speaking) and the various types of exercises that are part of the IELTS test. In addition, they will learn to effectively apply their foreign language skills, as well as the test strategies they have earned to solving the tasks set in the examination.

[*updated 05.10.2020*]

**Module content:**
_ Structure and parts of the Academic IELTS test
_ Listening comprehension und listening comprehension strategies
_ Exercises on reading comprehension and reading comprehension strategies (scanning, skimming, reading for gist)
_ Writing exercises (writing short argumentative essays)
_ Writing exercises for describing graphics and trends
_ Structuring texts (coherence and cohesion)
_ Oral exercises to help students learn to present arguments logically
_ General vocabulary and grammar exercises

[*updated 05.10.2020*]

**Teaching methods/Media:**
The learning goals will be achieved through integrated training of the four basic skills (listening comprehension, reading comprehension, speaking and writing) supported by the use of multimedia.

Communicative competence training will take place within the framework of learner-centred lessons in the multimedia computer language laboratory.

[*updated 05.10.2020*]

**Recommended or required reading:**
The course is based on the following textbook:
Cullen, Pauline, French, Amanda, Jakeman, Vanessa. The Official Cambridge Guide to IELTS. For Academic and General Training (with DVD and answer key). Cambridge University Press, 2014.

Other recommended learning materials: IELTS. Official IELTS Practice Materials 2. (incl. DVD). UCLES, 2010. Jakeman, Vanessa and Mc Dowell, Clare. Action Plan for IELTS (with Audio CD). Academic Module. Cambridge University Press, 2013.

[*updated 05.10.2020*]

# Statistical Methods with SPSS

**Module name (EN): Statistical Methods with SPSS**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2522.SPSS

**Hours per semester week / Teaching method:**
-

**ECTS credits:**
5

**Semester:** 5

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**

[*updated 29.04.2024*]

**Applicability / Curricular relevance:**

BMT2522.SPSS Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, optional course
BMT2522.SPSS Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, optional course
MST2.SPS Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , semester 5, optional course

**Workload:**
The total student study time for this course is 150 hours.

**Recommended prerequisites (modules):**
BMT3401.STA

[*updated 28.11.2024*]

**Recommended as prerequisite for:**

**Module coordinator:**
Prof. Dr. Gerald Kroisandt

**Lecturer:** Prof. Dr. Gerald Kroisandt

[*updated 29.11.2024*]

**Learning outcomes:**
This course will introduce statistical methods for the design of experiments and the evaluation of technical, biological and medical data.
The course uses practical examples that enable the students to understand the background and correctly apply statistical methods in complex contexts and interpret their results correctly.
Students will be given an overview of the various possibilities, application contexts and risks. After successfully completing this course, students will be able to use the statistics software SPSS.

[*updated 29.04.2024*]

**Module content:**
1. Biometrics and epidemiology - what are they?
2. Study design, most important types of studies
   randomized studies, field studies, cross-sectional studies, cohort studies, etc. and dependent and dependent samples)
3. Introduction to SPSS
4. Importance of frequencies, risk analysis and forecasting
   (How often does a disease occur? Normality or deviation? Is the patient sick or healthy?
   What are the risk factors for a disease? What are the consequences of a disease? Evidence-based medicine)
5. Properties of point estimators, special point estimators
6. Tolerance ranges
7. Statistical hypothesis tests
   (null hypothesis, alternative hypothesis, 1st type error, 2nd type error, statistical significance,
   one- and two-sided test, two- and multiple-sample tests, parametric and non-parametric,
   tests for dependent and independent samples, t-tests, non-parametric methods, etc.)
8. ANOVA (analysis of variance)

[*updated 29.04.2024*]

**Recommended or required reading:**

[*updated 29.04.2024*]

# Technical Documentation

**Module name (EN): Technical Documentation**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2580.TDO

**Hours per semester week / Teaching method:**
2V (2 hours per week)

**ECTS credits:**
2

**Semester:** according to optional course list

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**

[*updated 14.05.2025*]

**Applicability / Curricular relevance:**

BMT1580 Biomedical Engineering, Bachelor, regulation 01.10.2013 , optional course, non-medical/technical
BMT2580.TDO Biomedical Engineering, Bachelor, regulation 01.10.2018 , optional course, non-medical/technical
BMT2580.TDO Biomedical Engineering, Bachelor, regulation 01.10.2025 , optional course, non-medical/technical
E1580 (P200-0024) Electrical Engineering, Bachelor, regulation 01.10.2012 , optional course, non-technical
KI655 (P200-0024) Computer Science and Communication Systems, Bachelor, regulation 01.10.2014 , semester 6, optional course, non-technical
KIB-TDOK (P200-0024) Computer Science and Communication Systems, Bachelor, regulation 01.10.2021 , semester 6, optional course, non-technical
KIB-TDOK (P200-0024) Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , semester 6, optional course, non-technical
MAB.4.2.1.2 (P200-0024) Mechanical and Process Engineering, Bachelor, regulation 01.10.2013 , semester 5, optional course, not informatics specific, course inactive since 19.08.2021
MST.TDO (P200-0024) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2012 , semester 6, optional course, non-technical
MST.TDO (P200-0024) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2019 , semester 6, optional course, non-technical
MST.TDO (P200-0024) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , semester 6, optional course, non-technical
PIBWN65 (P200-0024) Applied Informatics, Bachelor, regulation 01.10.2011 , semester 5, optional course, not informatics specific
PIB-TDOK (P200-0024) Applied Informatics, Bachelor, regulation 01.10.2022 , semester 4, optional course,

not informatics specific
PIB-TDOK (P200-0024) Applied Informatics, Bachelor, regulation 01.10.2026 , semester 4, optional course, not informatics specific
TIB-TDOK Technical Computer Science, Bachelor, regulation 01.10.2026 , semester 6, optional course, non-technical
MST.TDO (P200-0024) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2011 , semester 6, optional course, non-technical

**Workload:**
30 class hours (= 22.5 clock hours) over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 37.5 hours available for class preparation and follow-up work and exam preparation.

**Recommended prerequisites (modules):**
None.

**Recommended as prerequisite for:**

**Module coordinator:**
Dipl.-Ing. Irmgard Köhler-Uhl

**Lecturer:** Dipl.-Ing. Irmgard Köhler-Uhl

[*updated 29.11.2024*]

**Learning outcomes:**
After successfully completing this module, students will be capable of examining and checking technical texts. They will be able to analyze different kinds of texts based on their target group intentions. The influences of text design will be illustrated and structures for easier text creation will be learned. The documentation of research and work findings, including how to handle quotations and Internet sources, their identification in texts and the creation of a bibliography will enable students to create technical/scientific texts more efficiently.

[*updated 26.02.2018*]

**Module content:**
1 Text design in standards, guidelines and laws
2 Rules for technical texts
3 Operating instructions
4 Abstracts/text summaries
5 Comprehensibility of texts
6 Business correspondence
7 Notes, transcripts, minutes, reports
8 Structure and numbering of texts
9 Citation rules
10 Bibliography
11 Time management for the creation of longer texts

[*updated 26.02.2018*]

**Recommended or required reading:**
Lecture notes

[*updated 13.03.2007*]

# The Impact of Gender and Diversity on Careers and Studies (Submodule)

**Module name (EN): The Impact of Gender and Diversity on Careers and Studies (Submodule)**

**Degree programme:** Biomedical Engineering, Bachelor, regulation 01.10.2025

**Module code:** BMT2583.AGDT

**Hours per semester week / Teaching method:**
-

**ECTS credits:**
3

**Semester:** 5

**Mandatory course:** no

**Language of instruction:**
German

**Assessment:**
Project work (e-portfolio)

[*updated 19.12.2023*]

**Applicability / Curricular relevance:**

BMT2583.AGDT (P213-0188) Biomedical Engineering, Bachelor, regulation 01.10.2018 , semester 5, optional course
BMT2583.AGDT (P213-0188) Biomedical Engineering, Bachelor, regulation 01.10.2025 , semester 5, optional course
EE1640 (P213-0188) Energy system technology / Renewable energies, Bachelor, regulation 01.10.2022 , optional course, category 2
FT72 Automotive Engineering, Bachelor, regulation 01.10.2019 , optional course
KIB-GDT (P213-0188) Computer Science and Communication Systems, Bachelor, regulation 01.10.2022 , optional course
MAB_19_4.2.1.37 (P213-0188) Mechanical and Process Engineering, Bachelor, regulation 01.10.2019 , optional course
MST2.GDBT (P213-0188) Mechatronics and Sensor Technology, Bachelor, regulation 01.10.2020 , optional course
PIB-GDT (P213-0188) Applied Informatics, Bachelor, regulation 01.10.2022 , optional course
PIB-GDT (P213-0188) Applied Informatics, Bachelor, regulation 01.10.2026 , optional course
TIB-GDT Technical Computer Science, Bachelor, regulation 01.10.2026 , optional course

**Workload:**
The total student study time for this course is 90 hours.

**Recommended prerequisites (modules):**
None.

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|---|
| **Recommended as prerequisite for:** |
| **Module coordinator:**<br>Sandra Wiegand, M.A. |
| **Lecturer:** Sandra Wiegand, M.A.<br><br>[*updated 29.11.2024*] |
| **Learning outcomes:**<br><br>[*updated 19.12.2023*] |
| **Module content:**<br><br>[*updated 19.12.2023*] |
| **Recommended or required reading:**<br><br>[*updated 19.12.2023*] |