

## Program and Course Description

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*Engineering and Management*

*Bachelor of Engineering (B. Eng.)*

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Study Regulation: WS 2015/16

as per: 30.01.2025

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## 1 Overview

<b>Name of the program</b>	Engineering and Management
<b>Study type &amp; degree</b>	Bachelor of Engineering (full time)
<b>First start date</b>	WS 15/16; Start only in winter semester
<b>Standard period of study</b>	7 Semesters (210 ECTS, 148 SWS)
<b>Study location</b>	THI-Campus in Ingolstadt
<b>Language of instruction</b>	English
<b>Cooperation</b>	None
<b>Admission requirement</b>	University entrance qualification
<b>Capacity</b>	55 students p.a.
<b>Program director</b>	Prof. Dr. Andrea Eisenberg

## 2 Introduction

The text describes the current state of the program modules in the bachelor's degree "Engineering and Management" according to its Study and Examination Regulation (German: SPO "Studien- und Prüfungsordnung").

The course description (German: "Modulhandbuch") provides the objectives and content of the individual compulsory modules and a breakdown of SWS (semester hours per week) per module and semester.

## 2.1 Objectives

The Bachelor of Engineering program "Engineering and Management" of Technische Hochschule Ingolstadt addresses students who intend to work for international companies in functions that require both, an engineering background as well as a thorough understanding of management practices.

The objective of the bachelor's degree "Engineering and Management" is to teach the expertise, methodological competence and social skills that enable students to independently apply scientific findings and methods and to act responsibly in the workplace and society in the occupational field of industrial engineering. Graduates are to be qualified to take on tasks in international enterprises and/or cross-border tasks.

## 2.2 Admission Requirements

The student's eligibility for the Bachelor's degree "Engineering and Management" is demonstrated by evidence of the general conditions according to the Ordinance on the Eligibility for Studying at the Universities of the Free State of Bavaria and the State-Recognized Non-State Universities (Eligibility Ordinance - QualV) of 2nd November 2007 (Law and Order Gazette 2007, p. 767, Bavarian Collection of Laws 2210-1-1-3-UK/-WFK) in its current version.

The binding regulations for this curriculum can be found in:

- Study and Examination Regulations (SPO) for the Bachelor's degree program "Engineering and Management" (B. Eng.) as of 24.11.2014.
- "Rahmenprüfungsordnung" (RaPO) of Technische Hochschule Ingolstadt.
- „Allgemeine Prüfungsordnung" (APO) of Technische Hochschule Ingolstadt.
- „Immatrikulationssatzung" of Technische Hochschule Ingolstadt.

The sequence of studies is influenced by the regulations of the Study and Examination Regulations ("Studien- und Prüfungsordnung").



## 2.3 Preliminary internship

The study program requires a preparatory internship (German: "Vorpraxis") of at least 6 weeks, which must be completed before the start of the 4th semester (during semester breaks).

The preparatory internship is not part of our admission requirements.

## 2.4 Target Group

The program addresses prospective students,

- who would like to work as engineers at the interface between technology and business administration.
- who are enthusiastic about the development, production, purchasing and sales of products and services.
- with interest in interdisciplinary studies at the interface of technology, economy and sociology with a strong focus on the current state of foresight research and challenges of the future.
- that prefer a master's program fully taught in English, like to gain intercultural experience and go for an international career at home and abroad.

## 2.5 Structure of the program

The standard period of study is seven semesters. The course is divided into two study sections. The first part of the course comprises two theoretical semesters. The second part of the program comprises four theoretical and one practical semester, which is the fifth semester.

The practical training or preliminary work according to §9 of the THI matriculation statute is required.

The following figure shows the curriculum.

### *Curriculum*

<b>1. Semester</b>				
Mathematics 1	Computer Science	Physics		
Business Administration	Start-Up Project	Foreign Language 1		
<b>2. Semester</b>				
Mathematics 2	Mechanical Design 1	Materials Science		
Financial Accounting	Production System	Foreign Language 2		
<b>3. Semester</b>				
Software Development	Engineering Mechanics	Mechanical Design 2		
Cost Accounting	Automation Technologies	Foreign Language 3		
<b>4. Semester</b>				
Electrical Engineering	Power Engineering	Controlling		
Marketing	Production Planning & Logistics	Selected Topics of International Management		
<b>5. Semester</b>				
Industry Internship		Seminar		
<b>6. Semester</b>				
Intercultural Studies	Business Information Systems	Project	Project- and Quality-Management	Electives
<b>7. Semester</b>				
Electives	Seminar		Bachelor's Thesis	

## 2.6 Prerequisites for advancement

Only students who have earned at least 42 ECTS credit points from the modules in the first part of the course are entitled to enter the second part of the course.

Only students who have achieved a grade of "sufficient" or higher in all the examinations and essential assessments done during the course in the first part of the course and have earned at least 20 ECTS credit points from the compulsory modules in the second part of the course are entitled to enter the practical studies semester.

## 2.7 Industry internship

The practical studies semester in the second part of the course lasts 20 weeks and is accompanied by classes.

The practical studies semester must be completed in a non-German speaking foreign country. Alternatively, the practical studies semester may be completed in German-speaking countries if a connection to international business is guaranteed (e.g., through work in the areas of international product management, global product development, international marketing, international production and logistics).

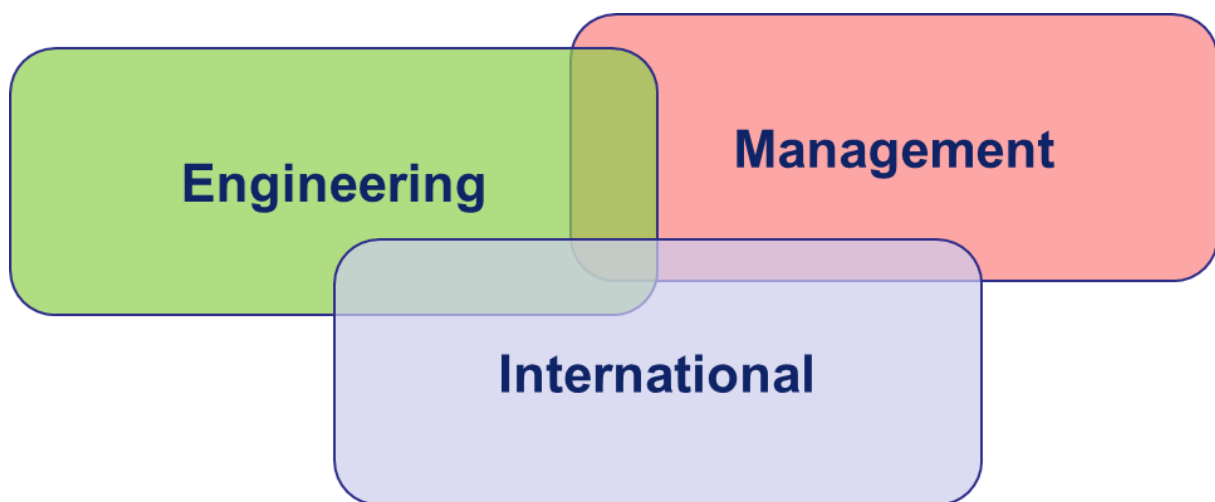
## 2.8 Concept

The program was established in the winter term 2015/2016.

The concept was built on the already well-established German-speaking course “Wirtschaftsingenieurwesen”. In addition, international aspects were included.

### 3 Qualification Profile

The program provides a sound engineering education with modules such as engineering mechanics, material sciences, mechanical design, computer science, mathematics, software development and electrical engineering. Besides, above mentioned job requirements regarding management know-how are met by lectures such as accounting, marketing and controlling. In addition to those competencies, “soft skills” are trained, e.g., by team projects and student presentations.

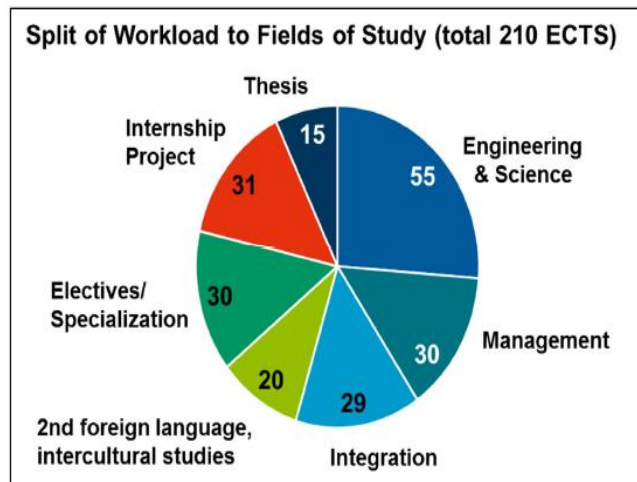


The studies also prepare students for international projects and positions. Specific modules such as “Intercultural studies”, “elected topics in international management” and a second foreign language are part of the curriculum.

Students gain further international exposure by studying abroad at one of our partner universities. Internships, which are scheduled during the 5th semester, help to gain work experience as well as business contacts that may lead to future employment.

Last-but-not-least, lectures are taught in English - the language of international business. While attending lectures taught in the English language, students are encouraged to learn German as their second foreign language (courses scheduled during semesters 1, 2 and 3).

The total workload amounts to 210 ECTS. The curriculum consists of seven fields of study:





### 3.1 Mission Statement

The program integrates the guiding principle of teaching in the following way:

*We prepare our students for the challenges of the future:*

- It is an interdisciplinary program, which enables students to develop future-oriented solutions for interdisciplinary challenges.
- It qualifies students to help shape social changes such as the digital transformation and technological change. It sensitizes students to the sustainable use of the environment and resources, to socially responsible behavior and to social commitment.
- Personal development and team skills at the interface between technology and business are actively challenged and promoted.

*We enable our students to develop solutions to problems based on scientific knowledge:*

- High share of engineering modules in the curriculum, especially in the first stage of study.
- Technical and methodological competence in both technical and management modules in both study parts.
- Team skills and social skills are developed at the interface between technology and management, through internships, project work, elective modules and general scientific modules.

*We open outstanding regional and international perspectives for our students:*

- The bachelor program is fully taught in English, addresses international students and creates intercultural competences.
- In this way, the program contributes to a cosmopolitan, international campus.
- Our numerous cooperations with companies in the region enable our students to start their careers in the best possible way, both regionally and internationally.

*We help all students discover and realize their individual potential:*

- the bachelor program is international and intercultural. Hence, the program promotes performance in an appreciative cooperation. We meet each other with tolerance and openness and understand diversity as an opportunity to learn from each other and develop further.
- through the individual dialogue with lecturers, consisting of professors from the TH Ingolstadt and selected lecturers from research and industry.

## 3.2 Study Objectives

### 3.2.1 Subject-specific Competencies

The students acquire in-depth knowledge in the areas of engineering and management.

The studies also prepare students for international projects and positions. Specific modules such as “Intercultural studies”, “Selected topics in international management” and a second foreign language are part of the curriculum.

### 3.2.2 Interdisciplinary Competencies of the Study Program

#### Methodical competences:

The graduates are able:

- to work scientifically.
- to plan, compile and lead projects.
- to analyze interdisciplinary problems, to recognize comprehensive correlations, to transfer learned competences to new tasks and to evaluate the technical, economic and social impact of compiled solutions.

#### Social competences:

The graduates are able:

- to compile complex tasks in cross-functional and international teams, to solve conflicts in teams and to lead teams.
- to speak English fluently (incl. technical terms) and to react sensitively in intercultural affairs.
- to communicate their competences and to communicate generally.
- to convince and to become accepted.

#### Self-competences:

The graduates are able:

- to organize themselves and to manage their time.
- to have analytical and outcome-oriented intellectual power.
- to work target-oriented and autonomously.
- to present their results and themselves.

### 3.2.3 Examination Concept of the Program

The modules / examination subjects are specified in accordance with the curriculum including the type of examination and, in addition to written examinations, mainly consist of study work with colloquium, practical work, seminar work, project work, presentation and oral examination. The technical and business modules of the first part of the course are usually examined in writing.

When developing the course, care was taken to ensure that a sensible mix of different types of exams is used. The triad of technology - business - interdisciplinary also forms the framework for the exams.

Module	Form of examination
Mathematics 1	schrP
Computer Science	schrP
Physics	schrP
Business Administration	schrP
Start-up project	PA
Foreign Language 1 (German or English)	LN
Mathematics 2	schrP
Mechanical Design 1	schrP
Material Science	schrP
Financial Accounting	schrP
Production Systems	schrP
Foreign Language 2 (German or English)	LN
Software Development	schrP
Engineering Mechanics	schrP
Mechanical Design 2	SA
Cost Accounting	schrP
Automation Technology	schrP
Foreign Language 3 (German or English)	LN
Electrical Engineering	schrP
Power Engineering	schrP
Controlling	schrP
Marketing	schrP
Selected Topics in International management	mdIP
Production Planning and Logistics	schrP
Industry Internship	PrB
Seminar	LN
Project and quality management	schrP
Intercultural Studies	StA
Business Information Systems	schrP
Project	PA
Electives in Engineering and Management	6 LN
Bachelor Thesis Seminar	Koll
Bachelor Thesis	BA

### 3.2.4 Practical relevance of the program

All lecturers have a long-standing background in industry and / or an above-average academic qualification. The methods learned are used in projects in the following semesters. In addition, the practical semester, and a Bachelor thesis, usually written in cooperation with industry, ensure the application relevance.

### 3.2.5 Contribution of individual modules to the objectives of the program

Module	Professional competencies	Methodological competencies	Social competencies	Personal competencies
Mathematics 1	++	+	o	o
Computer Science	++	+	o	o
Mechanical Design 1	+	++	o	+
Business Administration	+	++	+	o
Start-up project	+	+	++	++
Foreign Language 1	o	++	++	o
Mathematics 2	++	+	o	o
Physics	++	+	o	o
Material Science	++	+	o	o
Financial Accounting	++	++	o	o
Production Systems	+	+	o	+
Foreign Language 2	o	++	++	o
Software Development	+	++	o	+
Engineering Mechanics	+	++	o	+
Mechanical Design 2	+	++	o	+
Cost Accounting	+	++	o	o
Automation Technology	++	++	o	o
Foreign Language 3	o	++	++	o

Module	Professional competencies	Methodological competencies	Social competencies	Personal competencies
Electrical Engineering	++	++	o	o
Power Engineering	++	++	o	o
Controlling	+	++	o	+
Marketing	+	+	++	++
Selected Topics in International management	+	++	o	+
Production Planning and Logistics	+	++	+	+
Industry Internship	+	+	++	++
Seminar	+	++	+	++
Project and quality management	+	++	+	o
Intercultural Studies	o	+	++	++
Business Information Systems	+	+	o	+
Project	+	+	++	++
Electives in Engineering and Management	++	++	++	++
Bachelor Thesis Seminar	+	++	o	++
Bachelor Thesis	+	++	++	++

### 3.3 Possible professional fields

The program is designed to allow graduates to succeed in inter-disciplinary jobs in an international environment. Graduates of this program are in great demand. There is a wide field of application in specialist or management roles in national or international companies and organizations.

Graduates are especially well prepared to take on specialist and management roles in the following areas:

- International Product Manager
- Cost Engineer
- Industrial Engineer, especially for companies with international production network
- Manager International Project
- Strategic Purchasing Manager
- Assistant to board member
- International Sales Manager, esp. for high-tech products
- Management Consultant
- Team leads global functions, e.g., purchasing, IT, planning.

## 4 Dual Studies

In cooperation with selected industry partners, the study program can also be completed in dual studies model. The dual study model is offered as a study program with in-depth practice, in which the regular study program is supplemented by intensive practical phases in a company. It is also offered as „Verbundstudium“ (combined dual study program), which combines university studies with a regular vocational training/apprenticeship.

In dual study model, academic and practical phases (especially during semester breaks and for the final thesis) regularly alternate during study. The lecture times in the dual study model correspond to the standard study and lecture times at the THI.

By having a significantly longer practical period, by benefitting from a linking of corporate topics with the contents of selected modules and by attending modules adapted specifically to the needs of dual study programs, students develop strong general practical competencies but also company-, domain- and sector-specific competencies. Additionally, to subject matter competencies also elements of personal development such as an assertive presence, presenting, working in teams and organizing work are trained and promoted in this study program. Thereby, graduates of this study program adapt more easily and fast to divisions, projects and processes of companies.

The curriculum of the two dual degree program models differs from the regular degree program concept in the following points:

- **Preliminary practice and practical semester in a cooperating company**  
In both dual study models, the preliminary practice for the study program and the practical semester are carried out in the cooperating company.
- **Dual modules**  
Separate FW subjects are regularly offered for dual students in the degree program. These courses are held at the university or a dual partner. Separate projects and separate practical seminars are also offered for dual students. Projects and practical seminars can be credited for competencies acquired outside of the university in the company as a place of learning. Where possible, individual courses are held by lecturers from the cooperation companies.
- **Final thesis in the cooperation company**  
In both dual study models, the final thesis is written at a cooperating company, usually on a practice-relevant topic related to the focus of study.

Organizationally, the two dual degree program models are characterized by the following components:

- **Introductory track**  
As part of the obligatory introductory week at the beginning of the program, a separate event is offered for dual degree students.
- **Mentoring**  
The central contact persons for dual students in the faculty are the respective program head of studies. They organize an annual mentoring meeting with the dual students of the respective study program.



- **Quality management**

In the evaluation and surveys at the THI on the quality assurance of the dual study separate question blocks are included.

- **„Forum dual“**

Organized by the Career Service and Student Counseling (CSS), the “Forum Dual” takes place once a year. The “Forum dual” promotes the professional-organizational exchange between the dual cooperation partners and the faculty and serves to ensure the quality of the dual study programs. All cooperation partner in the dual study program as well as representatives and dual students of the faculty are invited to the meeting.

Formal-legal regulation for dual studies for all degree programs of the THI are regulated in the APO (see §§ 17, 18 und 21) and the enrollment statutes (see §§ 8b und 18).

According to the above description, the following modules are different for dual students:

- Start-Up Project (5 ECTS)
- Marketing (5 ECTS)
- Production Planning and Logistics (5 ECTS)
- Project- and Quality-Management (5 ECTS)
- Project (5 ECTS)
- Internship (24 ECTS)
- Praxis-Reflexion für Dual-Studierende (FW) (2,5 ECTS)
- Strategic Management (FW) (5 ECTS)
- CAD/CAM für Zerspanung, 3D-Druck und Robotik (FW) (5 ECTS)
- Digital Factory Basics (FW) (5 ECTS)
- Qualitätssicherung (FW) (5 ECTS)
- Bachelor Thesis Seminar (3 ECTS)
- Bachelor Thesis (12 ECTS)

More detailed description can be found in the corresponding module description.

## 5 Description of Modules

## 5.1 Compulsory Modules

<b>Mathematics 1</b>			
<b>Module abbreviation:</b>	MA1_EGM_E	<b>SPO-No.:</b>	1
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	1
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Schlickewei, Ulrich		
<b>Lecturers:</b>	Schlickewei, Ulrich		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self-study:	67 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	1: Mathematics 1 (MA1_EGM_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP120 - written exam, 120 minutes (MA1_EGM_E) Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>Students:</p> <ul style="list-style-type: none"> <li>• have developed their ability to recognize which questions in engineering sciences can be tackled by mathematical methods and are able to post such questions themselves.</li> <li>• understand the logical way of reasoning, distinguish between a premise, a consequence, and a rule, and, furthermore, can build a line of argument within engineering applications.</li> <li>• recognize known types of problems both in familiar and in new contexts, can solve such problems using known methods.</li> <li>• understand the mathematical language used in the engineering literature and can describe in both oral and written form their own reasoning and solution approaches.</li> <li>• have acquired confidence in handling the introduced mathematical methods.</li> <li>• are capable to apply a software system to support the solution of mathematical problems.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Complex numbers: basics, rules, applications</li> <li>• Sequences and series: basics, convergence, applications</li> <li>• Functions and differential calculus: basics, elementary functions continuity, derivatives, applications</li> <li>• Power series: basics, Taylor development, radius of convergence, applications</li> </ul>			

<ul style="list-style-type: none"><li>• Integration in R: basics, methods of integration, applications</li></ul>
<b>Literature:</b>
<ul style="list-style-type: none"><li>• STRANG, Gilbert, 2010. <i>Calculus</i>. Wellesley, Mass.: Wellesley-Cambridge Press. ISBN 978-0-9802327-4-5</li><li>• STEWART, James, 2016. <i>Calculus</i>. Belmont, Calif.: Thomson Brooks/Cole. ISBN 978-1-305-26672-8, 1-305-26672-2</li><li>• ARENS, Tilo, 2015. <i>Mathematik</i> [online]. Berlin [u.a.]: Springer Spektrum PDF E-Book. ISBN 978-3-642-44919-2, 978-3-642-44918-5. Available via: <a href="https://doi.org/10.1007/978-3-642-44919-2">https://doi.org/10.1007/978-3-642-44919-2</a>.</li><li>• WEITZ, Edmund and Heike STEPHAN, 2021. <i>Konkrete Mathematik (nicht nur) für Informatiker: mit vielen Grafiken und Algorithmen in Python</i>. Berlin: Springer Spektrum. ISBN 978-3-662-62617-7</li><li>• KARPFFINGER, Christian, 2022. <i>Höhere Mathematik in Rezepten: Begriffe, Sätze und zahlreiche Beispiele in kurzen Lerneinheiten</i>. Berlin: Springer Berlin. ISBN 978-3-662-63304-5, 3-662-63304-3</li><li>• KOCH, Jürgen and Martin STÄMPFLE, 2018. <i>Mathematik für das Ingenieurstudium</i>. München: Hanser. ISBN 978-3-446-45166-7, 3-446-45166-8</li></ul>
<b>Additional remarks:</b>
There will be voluntary intermediate tests. With these a maximum of 10% of bonus points for the final exam can be accumulated.

<b>Mathematik 1</b>			
<b>Modulkürzel:</b>	MA1_DS	<b>SPO-Nr.:</b>	
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Data Science in Technik und Wirtschaft (SPO WS 22/23)	Pflichtfach	1
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	nur Wintersemester
<b>Modulverantwortliche(r):</b>	Schlickewei, Ulrich		
<b>Dozent(in):</b>	Schlickewei, Ulrich		
<b>Leistungspunkte / SWS:</b>	8 ECTS / 6 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:		70 h
	Selbststudium:		130 h
	Gesamtaufwand:		200 h
<b>Lehrveranstaltungen des Moduls:</b>	Mathematik 1		
<b>Lehrformen des Moduls:</b>	SU/Ü: Seminaristischer Unterricht/Übung		
<b>Prüfungsleistungen:</b>	schrP90 - schriftliche Prüfung, 90 Minuten		
	Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Abiturwissen Mathematik wie beispielsweise im "Brückenkurs Mathematik" wiederholt			
<b>Angestrebte Lernergebnisse:</b>			
Die Studierenden			
<ul style="list-style-type: none"> <li>• erkennen, welche Fragen in den Datenwissenschaften mit Hilfe von Mathematik beantwortet werden können und können selbst solche Fragen stellen.</li> <li>• verstehen logische Argumentation, erkennen Bedingung, Konsequenz und Regel, und sie können eine Argumentationskette im Kontext datenwissenschaftlicher Anwendungen aufbauen.</li> <li>• erkennen bekannte Typen von Aufgaben in bekannten und in neuen Zusammenhängen, können diese Aufgaben mit bekannten Verfahren lösen.</li> <li>• sind in der Lage, die in der Data-Science-Fachliteratur verwendete mathematische Sprache zu verstehen und eigene Argumentation und Lösungsansätze mündlich und schriftlich zu beschreiben.</li> <li>• können sicher mit den vorgestellten mathematischen Methoden umgehen.</li> </ul>			
<b>Inhalt:</b>			
Grundlagen: Zahlenmengen, komplexe Zahlen, vollständige Induktion			
<ul style="list-style-type: none"> <li>• Folgen und Reihen: Grundbegriffe, Konvergenz</li> <li>• Funktionen und Differenzialrechnung in einer Variable: Grundbegriffe, elementare Funktionen, Grenzwerte und Stetigkeit Ableitungsregeln, Anwendungen</li> </ul>			

<ul style="list-style-type: none"><li>• Integralrechnung in einer Variable: Grundbegriffe, Integrationstechniken, Anwendungen</li><li>• Gewöhnliche Differentialgleichungen: Grundlagen, Lösungsmethoden, Anwendungen</li></ul>
<b>Literatur:</b>
<ul style="list-style-type: none"><li>• WEITZ, Edmund, STEPHAN, Heike, 2021. <i>Konkrete Mathematik (nicht nur) für Informatiker: mit vielen Grafiken und Algorithmen in Python</i> [online]. Berlin: Springer Spektrum PDF E-Book. ISBN 978-3-662-62618-4. Verfügbar unter: <a href="https://doi.org/10.1007/978-3-662-62618-4">https://doi.org/10.1007/978-3-662-62618-4</a>.</li><li>• STEWART, James, 2021. <i>Calculus: early transcendentals</i>. Australia: Cengage Learning. ISBN 978-0-357-11351-6</li><li>• ARENS, Tilo und andere, 2022. <i>Mathematik</i>. Berlin: Springer Spektrum. ISBN 978-3-662-64388-4, 3-662-64388-X</li><li>• KOCH, Jürgen, STÄMPFLE, Martin, 2018. <i>Mathematik für das Ingenieurstudium</i> [online]. München: Hanser PDF e-Book. ISBN 978-3-446-45581-8. Verfügbar unter: <a href="https://doi.org/10.3139/9783446455818">https://doi.org/10.3139/9783446455818</a>.</li></ul>
<b>Anmerkungen:</b>
Es wird freiwillige Zwischentests geben, mit welchen bis zu 10% Bonuspunkte für die finale Klausur erreicht werden können.

<b>Mathematics 2</b>			
<b>Module abbreviation:</b>	MA2_EGM_E	<b>SPO-No.:</b>	2
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Elective subject	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Schlickewei, Ulrich		
<b>Lecturers:</b>	Schlickewei, Ulrich		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self-study:	67 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	2: Mathematics 2 (MA2_EGM_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP120 - written exam, 120 minutes (MA2_EGM_E) Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
Mathematics 1			
<b>Objectives:</b>			
Students:			
<ul style="list-style-type: none"> <li>• have further developed their ability to recognize which questions in engineering sciences can be tackled by mathematical methods and are able to post such questions themselves.</li> <li>• understand the logical way of reasoning, distinguish between a premise, a consequence, and a rule, and, furthermore, can build a line of argument within engineering applications.</li> <li>• recognize known types of problems both in familiar and in new contexts, can solve such problems using known methods.</li> <li>• understand the mathematical language used in the engineering literature and can describe in both oral and written form their own reasoning and solution approaches.</li> <li>• have acquired confidence in handling the discussed mathematical methods.</li> <li>• are capable to apply a software system to support the solution of mathematical problems.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Linear algebra: Vectors, matrices, linear systems of equations, determinants, inverse matrices, eigenvalues and eigenvectors, applications</li> <li>• Ordinary differential equations: basics, solution methods, applications</li> <li>• Differentiation in <math>\mathbb{R}^n</math>: basics, rules, applications</li> <li>• Integration in <math>\mathbb{R}^n</math>: basics, methods of integration, applications</li> </ul>			



<ul style="list-style-type: none"><li>• Curves: basics, vector analysis, applications</li></ul>
<b>Literature:</b>
<ul style="list-style-type: none"><li>• STEWART, James, 2016. <i>Calculus</i>. Belmont, Calif.: Thomson Brooks/Cole. ISBN 978-1-305-26672-8, 1-305-26672-2</li><li>• STRANG, Gilbert, 2017. <i>Calculus</i>. Wellesley, MA: Wellesley-Cambridge Press. ISBN 978-0-9802327-5-2</li><li>• STRANG, Gilbert, 2021. <i>Introduction to linear algebra</i>. Wellesley: Cambridge Press. ISBN 978-1-7331466-5-4, 1-7331466-5-2</li><li>• ARENS, Tilo und ET AL., 2015. <i>Mathematik</i>. Berlin [u.a.]: Springer Spektrum. ISBN 978-3-642-44918-5, 978-3-642-44919-2</li><li>• PAPULA, Lothar, <i>Mathematik für Ingenieure und Naturwissenschaftler</i>.</li><li>• KOCH, Jürgen und Martin STÄMPFLE, 2018. <i>Mathematik für das Ingenieurstudium</i>. München: Hanser. ISBN 978-3-446-45166-7, 3-446-45166-8</li></ul>
<b>Additional remarks:</b>
<p>There will be voluntary intermediate tests. With these a maximum of 10% of bonus points for the final exam can be accumulated.</p> <p>The final will be a digital written exam in a computer pool.</p>

<b>Mathematik 2</b>			
<b>Modulkürzel:</b>	MA2_DS	<b>SPO-Nr.:</b>	
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Data Science in Technik und Wirtschaft (SPO WS 22/23)	Pflichtfach	2
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	nur Sommersemester
<b>Modulverantwortliche(r):</b>	Schlickewei, Ulrich		
<b>Dozent(in):</b>	Schlickewei, Ulrich		
<b>Leistungspunkte / SWS:</b>	8 ECTS / 6 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:		70 h
	Selbststudium:		130 h
	Gesamtaufwand:		200 h
<b>Lehrveranstaltungen des Moduls:</b>	Mathematik 2		
<b>Lehrformen des Moduls:</b>	SU/Ü: Seminaristischer Unterricht/Übung		
<b>Prüfungsleistungen:</b>	schrP90 - schriftliche Prüfung, 90 Minuten Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe Fächeranerkennungslisten des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Mathematik 1			
<b>Angestrebte Lernergebnisse:</b>			
<p>Die Studierenden</p> <ul style="list-style-type: none"> <li>entwickeln ihre Fähigkeiten weiter zu erkennen, welche Fragen in den Datenwissenschaften mit Hilfe von Mathematik beantwortet werden können und können selbst solche Fragen stellen.</li> <li>verstehen logische Argumentation, erkennen Bedingung, Konsequenz und Regel, und sie können eine Argumentationskette im Kontext datenwissenschaftlichen Anwendungen aufbauen.</li> <li>erkennen bekannte Typen von Aufgaben in bekannten und in neuen Zusammenhängen, können diese Aufgaben mit bekannten Verfahren lösen.</li> <li>sind in der Lage, die in der Data-Science-Fachliteratur verwendete mathematische Sprache zu verstehen und eigene Argumentation und Lösungsansätze mündlich und schriftlich zu beschreiben.</li> <li>können sicher mit den vorgestellten mathematischen Methoden umgehen.</li> </ul>			
<b>Inhalt:</b>			
<ul style="list-style-type: none"> <li>Potenzreihen: Grundlagen, Taylor-Reihen, Anwendungen</li> <li>Matrizen: Grundlagen, Determinanten, Anwendungen</li> <li>Lineare Abbildungen: Grundlagen, Eigenwerte und Eigenvektoren, Anwendungen</li> <li>Differenzialrechnung in <math>\mathbb{R}^n</math>: Grundlagen, Differentiationsregeln, Anwendungen</li> </ul>			

- Integralrechnung in  $\mathbb{R}^n$ : Grundlagen, Integrationsmethoden, Anwendungen
- Kurven: Grundlagen, Vektoranalysis, Anwendungen

**Literatur:**

- LAY, David C., Steven R. LAY und Judi J. MCDONALD, 2022. *Linear algebra and its applications*. Boston: Pearson. ISBN 1-292-35121-7, 978-1-292-35121-6
- STRANG, Gilbert, 2021. *Introduction to linear algebra*. Wellesley: Cambridge Press. ISBN 978-1-7331466-5-4, 1-7331466-5-2
- WEITZ, Edmund, STEPHAN, Heike, 2021. *Konkrete Mathematik (nicht nur) für Informatiker: mit vielen Grafiken und Algorithmen in Python* [online]. Berlin: Springer Spektrum PDF e-Book. ISBN 978-3-662-62618-4. Verfügbar unter: <https://doi.org/10.1007/978-3-662-62618-4>.
- STEWART, James, 2021. *Calculus: early transcendentals*. Australia: Cengage Learning. ISBN 978-0-357-11351-6
- ARENS, Tilo, HETTLICH, Frank, KARPFFINGER, Christian, KOCKELKORN, Ulrich, LICHTENEGGER, Klaus, STACHEL, Hellmuth, 2022. *Mathematik* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-662-64389-1. Verfügbar unter: <https://doi.org/10.1007/978-3-662-64389-1>.
- KOCH, Jürgen, STÄMPFLE, Martin, 2018. *Mathematik für das Ingenieurstudium* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-45581-8. Verfügbar unter: <https://doi.org/10.3139/9783446455818>.

**Anmerkungen:**

Es wird freiwillige Zwischentests geben, mit welchen bis zu 10% Bonuspunkte für die finale Klausur erreicht werden können.

<b>Selected topics in Physics</b>			
<b>Module abbreviation:</b>	PHYS_EGM_E	<b>SPO-No.:</b>	3
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Haug, Thomas		
<b>Lecturers:</b>	Haug, Thomas (PHYS_EGM_E) Haug, Thomas (PHYS_EGM_E_P)		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	3: Selected topics in Physics (PHYS_EGM_E) Selected topics in Physics (admission requirement) (PHYS_EGM_E_P)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical course		
<b>Examinations:</b>	Selected topics in Physics: schrP90 - written exam, 90 minutes (PHYS_EGM_E)		
	Selected topics in Physics (admission requirement): LN - participation without/with success (PHYS_EGM_E_P)		
	Requirements: written exam, 90 minutes permitted aids: pocket calculator, not programmable any written documents (printed or handwritten)		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
PrA - Practical course (Admission requirement) Three laboratory experiments in small groups, each consisting of preparation, execution and report.			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
The students			
<ul style="list-style-type: none"> <li>understand and correctly apply the physical concepts related to dynamics, fluid mechanics and thermodynamics.</li> <li>predict the movement of objects also after collisions.</li> <li>predict the movement of oscillating systems with and without damping.</li> </ul>			

<ul style="list-style-type: none"><li>• judge correctly the efficiency and feasibility of thermodynamic cycles.</li><li>• calculate fluid dynamic cases without losses</li><li>• identify and determine heat transfer processes</li><li>• can think abstractly and solve exercises individually and in teams</li><li>• can evaluate and execute physical experiments.</li></ul>
<b>Content:</b>
<ul style="list-style-type: none"><li>• Introduction to dynamics, mechanics and energy, collision equations</li><li>• Thermodynamics (ideal gas equation cycle processes, work and heat exchange, entropy)</li><li>• Fluid mechanics (mass conservation, energy conservation, Bernoulli equation)</li><li>• Heat exchange (conduction convection)</li><li>• Practical exercises from of the following areas: dynamics, rotation, oscillations, aerodynamics and thermodynamics.</li></ul>
<b>Literature:</b>
<ul style="list-style-type: none"><li>• TIPLER, Paul A., 2007. <i>Physics for Scientists and Engineers</i>. ISBN ISBN-13: 978-1429202657</li></ul>
<b>Additional remarks:</b>
Prerequisite for participation in the written examination is a successfully completed practical course.

<b>Physik</b>			
<b>Modulkürzel:</b>	PHY_WI	<b>SPO-Nr.:</b>	3
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 20/21)	Pflichtfach	1
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Haug, Thomas		
<b>Dozent(in):</b>	Schweiger, Rudolf		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 4 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	3: Physik		
<b>Lehrformen des Moduls:</b>	SU/Ü/Pr - seminaristischer Unterricht/Übung/Praktikum		
<b>Prüfungsleistungen:</b>	3-Physik: schrP90 - schriftliche Prüfung, 90 Minuten Weitere Erläuterungen: schriftliche Prüfung, 90 Minuten Erlaubte Hilfsmittel: nicht programmierbarer Taschenrechner schriftliche Unterlagen (handschriftlich oder gedruckt)		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
Die Studierenden: <ul style="list-style-type: none"> <li>• sind in der Lage, grundsätzliche physikalische Konzepte in der Dynamik, Thermodynamik und Strömungsmechanik zu verstehen und anzuwenden.</li> <li>• sind befähigt, Bewegungs- und Stoßvorgänge von Körpern vorherzusagen.</li> <li>• sind befähigt, die Effizienz und Durchführbarkeit von Kreisprozessen zu beurteilen.</li> <li>• sind befähigt, einfache Strömungsvorgänge ohne Reibung zu berechnen.</li> <li>• sind befähigt, einfache Wärmeübergangsprozesse zwischen Festkörpern und Fluiden zu bestimmen.</li> <li>• besitzen Abstraktionsvermögen und können Aufgaben selbstständig und im Team strukturiert lösen.</li> <li>• sind in der Lage, ausgewählte physikalische Experimente selbstständig durchzuführen, die Daten auszuwerten und zu bewerten.</li> </ul>			

**Inhalt:**

## Mechanik:

- Kinematik des Massepunktes, freier Fall, waagrecht Wurf
- Dynamik, Newton'sche Axiome, Masse, Kraft, Gravitation
- Impuls, Arbeit, Energie, Leistung, Energieerhaltung, Nachhaltigkeit
- Stoßprozesse: elastischer und unelastischer Stoß
- Drehbewegungen, Drehmoment, Drehimpuls, Analogie Translation und Rotation
- Mechanik starrer Körper, Trägheitsmoment, Satz von Steiner
- Schwingungen, harmonische Schwingung, freie gedämpfte Schwingung
- Mechanik der Flüssigkeiten und Gase, Druck, Schweredruck, Bernoulli-Gleichung

## Thermodynamik:

- Temperatur, thermische Ausdehnung, Zustandsgleichung idealer Gase
- Kinetische Gastheorie, Gasdruck, thermische Energie
- 1. Hauptsatz der Thermodynamik, Wärmekapazität, Zustandsänderung idealer Gase
- Kreisprozesse
- Wärmeleitung, Konvektion, Wärmestrahlung, nachhaltiges Thermomanagement

Die Veranstaltung beinhaltet folgende Nachhaltigkeitsaspekte der UN (SDGs):

4: Quality Education; 7: Affordable and clean Energy; 13: Climate Action

**Literatur:**

- KUCHLING, Horst, 2014. *Taschenbuch der Physik: mit zahlreichen Bildern und Tabellen*. 21. Auflage. München: Fachbuchverlag Leipzig im Carl-Hanser-Verlag. ISBN 978-3-446-44218-4
- DOBRINSKI, Paul, KRAKAU, Gunter, VOGEL, Anselm, 2003. *Physik für Ingenieure* [online]. Wiesbaden: Vieweg+Teubner Verlag PDF e-Book. ISBN 978-3-322-93887-9, 978-3-322-93888-6. Verfügbar unter: <https://doi.org/10.1007/978-3-322-93887-9>.
- HERING, Ekbert, MARTIN, Rolf, STOHRER, Martin, 2002. *Physik für Ingenieure* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-662-09314-6, 978-3-662-09315-3. Verfügbar unter: <https://doi.org/10.1007/978-3-662-09314-6>.
- KUCHLING, Horst, *Taschenbuch der Physik*. Leipzig: Carl Hanser Verlag. ISBN 9783446424579
- HALLIDAY, David und Stephan W. KOCH, Band 22013. *Halliday Physik*. Weinheim: Wiley-VCH. ISBN 978-3-527-41146-7
- MAYR, Martin, *Technische Mechanik*. München: Carl Hanser Verlag. ISBN 978-3-446-44570-3
- SPURK, J. und N. AKSEL, . *Einführung in die Theorie der Strömungen*.
- LANGEHEINECKE, . *Thermodynamik für Ingenieure*.

**Anmerkungen:**

Praktikumsberichte

Bonussystem:

In der Lehrveranstaltung können Praktikumsaufgaben (im Labor oder digital) gestellt werden, die zu bearbeiten und mit Praktikumsberichten zu dokumentieren sind. Mit den Praktikumsberichten können je nach Qualität der Bearbeitung Bonuspunkte für die Prüfungsleistung erworben werden. Maximal ist eine Anrechnung von 10% der Gesamtpunktzahl in der Abschlussprüfung möglich.

<b>Computer Science</b>			
<b>Module abbreviation:</b>	CS_EGM_E	<b>SPO-No.:</b>	4
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	1
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Oelker, Martin		
<b>Lecturers:</b>	Oelker, Martin (CS_EGM_E) Oelker, Martin (CS_P_EGM_E)		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	4: Computer Science (CS_EGM_E) Computer Science (admission requirement) (CS_P_EGM_E)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical course		
<b>Examinations:</b>	Computer Science: schrP90 - written exam, 90 minutes (CS_EGM_E) Computer Science (admission requirement): LN - participation without/with success (CS_P_EGM_E)		
	Requirements: Within the practical course, small tests, which deal with essential topics of the lecture, will be given. Only if these assignments are successfully completed, admission to the final exam can be granted. Further specifications of these tests will be given in the lecture.		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
Practical course			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<ul style="list-style-type: none"> <li>• The students develop a practical understanding of the broad and dynamic field of computer science.</li> <li>• They are familiar with the basic principles of data processing.</li> <li>• They are safe in dealing with basic terms and key concepts of computing and computer systems.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Information and information representation for automated processing</li> <li>• Concepts of modern computer architectures</li> <li>• General concepts of operating systems</li> </ul>			



<ul style="list-style-type: none"><li>• Programming principles and universal concepts of programming languages</li><li>• Algorithms and data structures</li><li>• General principles of computer networking</li></ul>
<b>Literature:</b>
<ul style="list-style-type: none"><li>• BROOKSHEAR, J. Glenn und Dennis BRYLOW, 2020. <i>Computer Science: an overview</i>. 13. Auflage. Harlow: Pearson. ISBN 1-292-26342-3, 978-1-292-26342-7</li><li>• TANENBAUM, Andrew S. und Todd AUSTIN, 2013. <i>Structured computer organization</i>. Boston, Mass.; Munich [u.a.]: Pearson. ISBN 978-1-299-92455-0, 978-0-273-77533-1</li><li>• TANENBAUM, Andrew S. und Herbert BOS, 2015. <i>Modern operating systems</i>. Boston: Pearson. ISBN 978-1-292-06195-5</li><li>• TANENBAUM, Andrew S., David WETHERALL und Nick FEAMSTER, 2020. <i>Computer networks</i>. Harlow, United Kingdom: Pearson Education Limited. ISBN 978-1-292-37401-7</li></ul>
<b>Additional remarks:</b>
Prerequisite for participation in the written examination is a successfully completed practical course.

<b>Ingenieurinformatik</b>			
<b>Modulkürzel:</b>	INF_DS	<b>SPO-Nr.:</b>	
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Data Science in Technik und Wirtschaft (SPO WS 22/23)	Pflichtfach	1
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	nur Wintersemester
<b>Modulverantwortliche(r):</b>	Oelker, Martin		
<b>Dozent(in):</b>	Oelker, Martin		
<b>Leistungspunkte / SWS:</b>	8 ECTS / 6 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:		47 h
	Selbststudium:		153 h
	Gesamtaufwand:		200 h
<b>Lehrveranstaltungen des Moduls:</b>	Ingenieurinformatik		
<b>Lehrformen des Moduls:</b>	SU/Ü/Pr-seminaristischer Unterricht/Übung/Praktikum		
<b>Prüfungsleistungen:</b>	schrP90 - schriftliche Prüfung, 90 Minuten Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
<p>Die Studierenden erlangen ein praktisches Verständnis für den Bereich der Informatik als ingenieurmäßiges Werkzeug zur Problemlösung in den Datenwissenschaften. Nach Abschluss des Moduls sind sie in der Lage,</p> <ul style="list-style-type: none"> <li>• Dateien in Dateisystemen effektiv und wiederauffindbar zu organisieren.</li> <li>• Computer effektiv einzusetzen.</li> <li>• Betriebssystemfunktionalität (Kopieren, Umbenennen von Dateien etc.) über die grafische Oberfläche und Kommandozeile / Terminal aufzurufen.</li> <li>• Den Aufbau von Computersystemen samt deren Hardware- und Softwarekomponenten zu verstehen.</li> <li>• Wichtige Tools der IT-Sicherheit wie Passwortmanager oder digitale Signaturen zu verwenden.</li> <li>• Einfache Programme in einer Programmiersprache wie Python zu programmieren.</li> </ul>			
<b>Inhalt:</b>			
<ul style="list-style-type: none"> <li>• Grundlegende Begriffe der Datenverarbeitung: Daten, Information, Programme</li> <li>• Bereiche der Informatik (Theoretische, praktische, technische)</li> <li>• Hardware vs. Software; PC vs Android / iPhone</li> <li>• Aufbau und Verwendung von Dateisystemen, Plain-txt vs. binäre Dateien</li> <li>• Sicherer Umgang mit Computern (Dateisysteme, Programme, Kommandozeile)</li> </ul>			

- Virtuelle Maschinen, Installation des Linux-Betriebssystems
- Umgang mit der Kommandozeile und Skripting
- Server, Cloud-Umgebungen (z.B. Jupyter-Notebooks)
- IT-Sicherheit (Passwortmanager, digitale Signatur)
- Einfache Programmierfähigkeiten in einer imperativen Programmiersprache wie Python

**Literatur:**

- PETZOLD, Charles, 2023. *CODE: the hidden language of computer hardware and software*. Upper Saddle River, NJ: Pearson Education, Inc. ISBN 978-0-13-790933-9
- KUROSE, James F. und Keith W. ROSS, 2022. *Computer networking: a top-down approach*. Harlow, United Kingdom: Pearson. ISBN 978-1-292-40546-9, 1-292-40546-5
- BROOKSHEAR, J. Glenn und Dennis BRYLOW, 2020. *Computer Science: An Overview, Global Edition*. Harlow: Pearson Education, Limited. ISBN 978-1-292-26344-1

**Anmerkungen:**

Keine Anmerkungen.

<b>Mechanical Design 1</b>			
<b>Module abbreviation:</b>	MD1_EGM_E	<b>SPO-No.:</b>	5
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Tröber, Philipp		
<b>Lecturers:</b>	Tröber, Philipp		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	5: Mechanical Design 1 (MD1_EGM_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP120 - written exam, 120 minutes (MD1_EGM_E)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• know which standards must be taken into account for the creation of technical drawings</li> <li>• can create complete and standardized graphic representations of technical products</li> <li>• can apply the different projection methods</li> <li>• know how to select tolerances and fits appropriate to function and production</li> <li>• can apply their knowledge of the representation of various machine elements in technical drawings</li> <li>• can develop new components and assemblies by linking their knowledge and design them for production</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Symbolic representations used in technical drawings</li> <li>• Projection methods for the graphic representation of technical products</li> <li>• Sectional representation, cutouts, views, details</li> <li>• Dimensioning, dimensioning rules, edge symbols</li> <li>• ISO tolerance system, shape and position tolerances, tolerance calculation</li> <li>• Surface specifications</li> </ul>			

- Typical machine elements and standard parts and their graphic representation
- Design guidelines for various manufacturing processes
- Creation of freehand sketches
- Geometrical product specification

**Literature:**

GOMERINGER, Roland und andere, 2018. *Mechanical and Metal Trades Handbook*. Haan-Gruiten: Verlag Europa-Lehrmittel, Nourney, Vollmer GmbH & Co. KG. ISBN 978-3-8085-1915-8, 3-8085-1915-0

**Additional remarks:**

Moodle course with lecture notes, lecture videos, self-tests and practical exercises.

<b>Technische Mechanik 1</b>			
<b>Modulkürzel:</b>	TM1_WI	<b>SPO-Nr.:</b>	9
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 20/21)	Pflichtfach	1
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Ruppert, Maximilian		
<b>Dozent(in):</b>	Ruppert, Maximilian		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 4 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	9: Technische Mechanik 1		
<b>Lehrformen des Moduls:</b>	SU/Ü - seminaristischer Unterricht/Übung		
<b>Prüfungsleistungen:</b>	9-Technische Mechanik 1: schrP90 - schriftliche Prüfung, 90 Minuten Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
Die Studierenden: <ul style="list-style-type: none"> <li>• erhalten Einsicht in die Wirkung von Kräften und Momenten.</li> <li>• können statische Probleme durchdringen.</li> <li>• wenden Gleichgewichtsbedingungen an.</li> <li>• bestimmen sicher äußere (Lagerreaktionen) und innere Kräfte/Momente (Schnittreaktionen).</li> <li>• erlangen die Fähigkeit Schwerpunkte zu bestimmen.</li> <li>• lösen Problemstellungen mit Reibung.</li> <li>• stellen einfache Bewegungsgesetze auf.</li> <li>• befassen sich mit Trägheitskräften.</li> </ul>			
<b>Inhalt:</b>			
<ul style="list-style-type: none"> <li>• Einführung in die grundlegenden Begriffe und Zusammenhänge der Statik (Lager, Gelenke, Tragwerkselemente, etc.)</li> <li>• Zentrale ebene Kräftesysteme</li> <li>• Allgemeine ebene Kräftesysteme (mit Ausblick 3D)</li> </ul>			

- Statische Bestimmtheit
- Bestimmung von Schwerpunkten
- Schnittlasten
- Reibung
- Kinematische Beschreibung von Translation und Rotation
- Aufstellen von linearen Bewegungsgleichung (mit und ohne Massenwirkung), d'Alembertsche Trägheitskraft
- Umfangreiche Übungsaufgaben und –beispiele

**Literatur:**

- MAYR, Martin, 2015. *Technische Mechanik: Statik, Kinematik - Kinetik - Schwingungen, Festigkeitslehre*. München [u.a.]: Hanser. ISBN 978-3-446-44570-3, 978-3-446-44618-2
- HIBBELER, Russell C., *Kurzlehrbuch Technische Mechanik, Band 1 Statik*. 2011. München [u.a.]: Pearson Studium.
- GROSS, D. und andere, 2013. *Technische Mechanik - Band 1: Statik*. 12. Auflage. Berlin: Springer Verlag.
- HAUGER, Werner und andere, 2012. *Aufgaben zu Technische Mechanik 1 - 3: Statik, Elastostatik, Kinetik*. Berlin [u.a.]: Springer. ISBN 978-3-642-21185-0, 978-3-642-21186-7

**Anmerkungen:**

Keine Anmerkungen.

<b>Material Science</b>			
<b>Module abbreviation:</b>	MATSCI_EGM_E	<b>SPO-No.:</b>	8
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	1
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Landesberger, Martin		
<b>Lecturers:</b>	Landesberger, Martin (MATSCI_EGM_E) Landesberger, Martin (MATSCI_P_EGM_E)		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self-study:	67 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	8: Material Science (MATSCI_EGM_E) Material Science (admission requirement) (MATSCI_P_EGM_E)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical course		
<b>Examinations:</b>	Material Science: schrP90 - written exam, 90 minutes (MATSCI_EGM_E) Material Science (admission requirement): LN - participation without/with success (MATSCI_P_EGM_E) Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students:</p> <ul style="list-style-type: none"> <li>• know different types of chemical bonds and their occurrence in materials</li> <li>• are familiar with the most common metallic lattice structures and know the influence of these structural types on plastic formability</li> <li>• can denominate and sketch structural disorders and to explain the role of dislocations during plastic deformation</li> <li>• understand the context between different hardening mechanisms of metals and the kinds of disorder, responsible for the considered hardening effect</li> <li>• can explain the mechanisms of diffusion in solids, know the time and temperature dependence of diffusion processes and selected technical procedures, where diffusion plays an important role</li> <li>• are familiar with the basic types of phase diagrams in general and with the constitutional diagram Iron Carbon in particular</li> </ul>			



<ul style="list-style-type: none"><li>• know well, how solidification processes are influenced by nucleation and crystal growth and therefore, how the microstructure and properties of cast parts can be controlled</li><li>• know the fundamentals of the kinetics of solid-state reactions and understand the mechanism, course and result of martensitic transformation and precipitation reactions as well.</li></ul>
<b>Content:</b>
<ul style="list-style-type: none"><li>• Atomic structure and the nature of chemical bonding</li><li>• Structures of solids, especially metals</li><li>• Imperfections in real crystals</li><li>• Plastic deformation in ideal and real crystals, hardening effects by disorders</li><li>• Diffusion – mechanism, meaning and applications</li><li>• Phases and phase diagrams</li><li>• Kinetics of solidification</li><li>• Kinetics of solid-state reactions – martensitic transformation and precipitation reactions</li><li>• Materials testing and material properties</li></ul>
<b>Literature:</b>
<ul style="list-style-type: none"><li>• ASKELAND, Donald R. und Wendelin J. WRIGHT, c 2016. <i>The science and engineering of materials</i>. Boston, Mass.: Cengage Learning. ISBN 978-1-305-07710-2, 1-305-07710-5</li><li>• CALLISTER, William D. und David G. RETHWISCH, 2020. <i>Materials science and engineering: an introduction</i>. 10. Auflage. Hoboken, NJ: Wiley. ISBN 978-1-119-45391-8</li><li>• FISCHER, Traugott, 2009. <i>Materials science for engineering students</i>. Amsterdam [u.a.]: Elsevier, Academic Press. ISBN 978-0-12-373587-4, 0-12-373587-4</li></ul>
<b>Additional remarks:</b>
No additional remarks.

<b>Werkstofftechnik</b>			
<b>Modulkürzel:</b>	WT_WI	<b>SPO-Nr.:</b>	10
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 20/21)	Pflichtfach	2
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Landesberger, Martin		
<b>Dozent(in):</b>	Neuner, Frank		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 4 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	10: Werkstofftechnik		
<b>Lehrformen des Moduls:</b>	SU/Ü/PR - Seminaristischer Unterricht/Übung/Praktikum		
<b>Prüfungsleistungen:</b>	10-Werkstofftechnik: schrP90 - schriftliche Prüfung, 90 Minuten Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
<p>Die Studierenden:</p> <ul style="list-style-type: none"> <li>• wissen um den Zusammenhang zwischen atomaren und kristallographischen Strukturen und deren grundlegende Auswirkung auf makroskopische Werkstoffeigenschaften.</li> <li>• erhalten ein Grundverständnis wie durch gezielte Veränderungen der Mikrostrukturen eines Werkstoffes die mechanischen Eigenschaften gezielt verändert werden können.</li> <li>• verstehen die Reaktion der Werkstoffe auf die Einwirkung von Temperatur und mechanischen Belastungen.</li> <li>• können Phasendiagramme lesen und verstehen.</li> <li>• verstehen das Eisen-Kohlenstoffdiagramm und deren Werkstoffe.</li> <li>• verstehen die Wärmebehandlungsmöglichkeiten von metallischen Werkstoffen.</li> <li>• versteht Grundlegendes zu Nicht-Eisenmetallen.</li> <li>• verstehen die grundlegenden Werkstoffprüfungen.</li> <li>• erhalten ein Grundverständnis zur Struktur eines Werkstofflabors im Maschinenbau.</li> </ul>			

**Inhalt:**

- Aufbau der Werkstoffe
- Reaktion der Werkstoffe auf Temperatur und mechanischen Einwirkungen
- Wärmebehandlungen von metallischen Werkstoffen
- Verfahren der zerstörenden und zerstörungsfreien Werkstoffprüfungen
- Praktische Vorführungen und Übungen im Werkstofflabor

**Literatur:**

- BARGEL, Hans-Jürgen, SCHULZE, Günter, 2018. *Werkstoffkunde* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-662-48629-0. Verfügbar unter: <https://doi.org/10.1007/978-3-662-48629-0>.
- ROOS, Eberhard, MAILE, Karl, SEIDENFUß, Michael, 2017. *Werkstoffkunde für Ingenieure: Grundlagen, Anwendung, Prüfung* [online]. Berlin: Springer Vieweg PDF e-Book. ISBN 978-3-662-49532-2. Verfügbar unter: <https://doi.org/10.1007/978-3-662-49532-2>.
- SEIDEL, Wolfgang W., HAHN, Frank, 2018. *Werkstofftechnik: Werkstoffe - Eigenschaften - Prüfung - Anwendung: mit 389 Bildern sowie zahlreichen Tabellen, Beispielen, Übungen und Testaufgaben* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-45688-4. Verfügbar unter: <https://doi.org/10.3139/9783446456884>.
- WEIßBACH, Wolfgang, DAHMS, Michael, JAROSCHEK, Christoph, 2015. *Werkstoffkunde: Strukturen, Eigenschaften, Prüfung* [online]. Wiesbaden: Springer Fachmedien PDF e-Book. ISBN 978-3-658-03919-6, 978-3-658-03918-9. Verfügbar unter: <https://doi.org/10.1007/978-3-658-03919-6>.
- CALLISTER, William D., David G. RETHWISCH und Michael SCHEFFLER, 2013. *Materialwissenschaften und Werkstofftechnik: eine Einführung*. Weinheim: Wiley-VCH. ISBN 978-3-527-33007-2, 3-527-33007-0
- HORNBOGEN, Erhard, EGGELER, Gunther, WERNER, Ewald, EGGELER, Gunther, 2019. *Werkstoffe: Aufbau und Eigenschaften von Keramik-, Metall-, Polymer- und Verbundwerkstoffen* [online]. Berlin: Springer Vieweg PDF e-Book. ISBN 978-3-662-58847-5. Verfügbar unter: <https://doi.org/10.1007/978-3-662-58847-5>.
- WORCH, Hartmut und Werner SCHATT, 2011. *Werkstoffwissenschaft*. 10. Auflage. Weinheim: Wiley-VCH. ISBN 978-3-527-32323-4, 3-527-32323-6

**Anmerkungen:**

Keine Anmerkungen.

<b>Business Administration</b>			
<b>Module abbreviation:</b>	BA_EGM_E	<b>SPO-No.:</b>	9
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	1
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Eisenberg, Andrea		
<b>Lecturers:</b>	Albrecht, Tobias; Eisenberg, Andrea		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	9: Business Administration (BA_EGM_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (BA_EGM_E) Requirements: None		
<b>Usability for other study programs:</b>	None		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• understand (on a high level) the various disciplines of business administration including the respective decision needs.</li> <li>• learn how to judge situations using a business logic and specifically how to evaluate projects or investments.</li> <li>• develop a basis for subsequent management subjects included in the curriculum (accounting, controlling, marketing).</li> <li>• learn about selected practical business topics, which are not covered in subsequent subjects of the curriculum, including the setup of a company and human resource management.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• The subject of business administration, incl. economic principle, resources, companies, business as a science</li> <li>• Profit generation: the term profit, limitations, balance sheet, profit-/loss statement, shareholder value, entrepreneurial risks, leverage effect</li> <li>• Setup of a company - factors of production (management, labour, means of production, raw material), further differentiation of management activities (leadership, planning, decision making, organization, monitoring)</li> </ul>			

- Setup of a company - legal form, alliances & partnering, choice of industrial location
- Human resource management: planning, recruiting, personnel layoff, personnel deployment, development, leadership

**Literature:**

It will be specified at the beginning of the lecture.

**Additional remarks:**

No additional remarks.

<b>Allgemeine Betriebswirtschaftslehre und Volkswirtschaftslehre</b>			
<b>Modulkürzel:</b>	BWL_WI	<b>SPO-Nr.:</b>	9
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 17/18)	Pflichtfach	1
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Götz, Heike		
<b>Dozent(in):</b>	Eisenberg, Andrea; Götz, Heike		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 4 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	48 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	9: Allgemeine Betriebswirtschaftslehre und Volkswirtschaftslehre		
<b>Lehrformen des Moduls:</b>	SU/Ü - Seminaristischer Unterricht/Übung		
<b>Prüfungsleistungen:</b>	schrP90 - schriftliche Prüfung, 90 Minuten		
	Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
Teil 1: Betriebswirtschaftslehre			
Die Studierenden:			
<ul style="list-style-type: none"> <li>• gewinnen einen Überblick über die Teilbereiche der Allgemeinen Betriebswirtschaftslehre, insb. der jeweils relevanten Entscheidungstatbestände,</li> <li>• entwickeln und stärken ein „ganzheitliches betriebswirtschaftliches Denken“ indem Sie die Zusammenhänge und Zielsetzungen der einzelnen Teilbereiche verstehen</li> <li>• kennen wesentliche Grundbegriffe der BWL sowie die wesentlichen Funktionen der Unternehmensführung</li> <li>• können mit Hilfe geeigneter Instrumente und Kennzahlen konkrete betriebswirtschaftliche Situationen analysieren und begründete Lösungen für reale Fragestellungen finden</li> <li>• schaffen eine Grundlage für weiterführende BWL-Fächer im Studium (z.B. Marketing, Produktion und Logistik, Rechnungswesen).</li> </ul>			

<p>Teil 2: Volkswirtschaftslehre</p> <p>Die Studierenden:</p> <ul style="list-style-type: none"><li>• verstehen die Bedeutung der VWL für unternehmerische Entscheidungen</li><li>• kennen die grundsätzlichen mikroökonomischen Konzepte wie Marktformen, Nachfrage- und Angebotskurve, Marktgleichgewicht und Marktversagen und können diese auf reale Fragestellungen anwenden</li><li>• verstehen die Bedeutung der Geldpolitik und können insbesondere die Instrumente der Zentralbanken erklären und verstehen die Ursachen und Konsequenzen von Inflation und Deflation</li><li>• verstehen das Konzept ökonomischer Wohlfahrt und wirtschaftlichen Wachstums, kennen insbesondere die Bedeutung des BIP und können wirtschaftliche Transaktionen in Bezug auf ihre Wirkung auf das BIP analysieren</li></ul>
<p><b>Inhalt:</b></p> <p>Teil 1: Betriebswirtschaftslehre</p> <ul style="list-style-type: none"><li>• Teilbereiche und Gegenstand der Betriebswirtschaftslehre</li><li>• Betriebswirtschaftliche Grundbegriffe: Wirtschaften und ökonomisches Prinzip, Wirtschaftssubjekte, Abgrenzung Betrieb und Unternehmen, Unternehmensrechtsformen, etc.</li><li>• Aufgaben der Unternehmensführung im Überblick: Planung und Entscheidung, Organisation, Personalwirtschaft und Kontrolle</li><li>• ausgewählte Bereiche des betriebswirtschaftlichen Wertschöpfungsprozesses, z. B.<ul style="list-style-type: none"><li>○ Produktion und Materialwirtschaft: Produktionsbegriff und Teilbereiche der Produktion, Produktionsfaktoren, Materialbegriff und Materialdisposition, Kostentheorie</li><li>○ Absatz: Markt und Marktteilnehmer, Marketingstrategien und Marketinginstrumente</li><li>○ Rechnungswesen, Investitionen und Finanzierung: Grundbegriffe des Rechnungswesens, Zusammenhang von Investition und Finanzierung, Quellen der Finanzierung</li></ul></li></ul> <p>Teil 2: Volkswirtschaftslehre</p> <ul style="list-style-type: none"><li>• Mikroökonomie: Marktformen (Polypol, Oligopol, Monopol), Preisbildung in den jeweiligen Marktformen, Marktversagen, Eingriffe in den Preisbildungsprozess</li><li>• Makroökonomie: Geldpolitik, Funktionen von Geld, Geldschöpfung, Instrumente der Zentralbanken, Ursachen und Konsequenzen von Inflation und Deflation, Verbraucherpreisindex und Inflationsraten, ökonomische Wohlfahrt, Bruttoinlandsprodukt, Wirtschaftswachstum</li></ul>
<p><b>Literatur:</b></p> <ul style="list-style-type: none"><li>• THOMMEN, Jean-Paul, 2008. <i>Managementorientierte Betriebswirtschaftslehre</i>. Zürich: Versus Verlag AG. ISBN 978-3-03-909118-8</li><li>• WÖHE, Günter, Ulrich DÖRING und Gerrit BRÖSEL, 2020. <i>Einführung in die Allgemeine Betriebswirtschaftslehre</i>. 27. Auflage. München: Verlag Franz Vahlen. ISBN 978-3-8006-6300-2</li><li>• MANKIW, N. Gregory und andere, 2021. <i>Grundzüge der Volkswirtschaftslehre</i>. Freiburg: Schäffer-Poeschel Verlag für Wirtschaft Steuern Recht GmbH. ISBN 978-3-7910-4997-7</li></ul>
<p><b>Anmerkungen:</b></p> <p>Keine Anmerkungen.</p>

<b>Financial Accounting</b>			
<b>Module abbreviation:</b>	FINACC_EGM_E	<b>SPO-No.:</b>	10
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Eisenberg, Andrea		
<b>Lecturers:</b>	Eisenberg, Andrea		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self-study:	67 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	10: Financial Accounting (FINACC_EGM_E)		
<b>Lecture types:</b>	SU/Ü-lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (FINACC_EGM_E)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
Students:			
<ul style="list-style-type: none"> <li>• know and use the specific terms of accounting</li> <li>• gain an understanding of the theoretical background of financial accounting</li> <li>• know the structure and the positions of a balance sheet and can determine the initial value and the subsequent measurement of balance sheet positions based on different accounting standards</li> <li>• understand the differences between German GAAP and IFRS accounting and can solve business problems according to both methods</li> <li>• know the structure and the positions of an income statement and can classify business transactions according to their impact on the income statement</li> <li>• understand the concept of cash and non-cash effective transactions and can classify business transactions according to their impact on cash and profit</li> <li>• understand and can prepare cash flow statements</li> <li>• know the content of annual reports and know how to analyze information in annual reports</li> <li>• can prepare balance sheets, profit and loss accounts and cash flow statements for several years based on an opening balance sheet and given transactions</li> </ul>			



**Content:**

- Basic principles of accounting
- German and European accounting principles and IFRS accounting standards
- Balance Sheet: structure and balance sheet positions, initial recognition and subsequent measurement according to German GAAP and according to IFRS
- Profit and loss accounts: structure and positions, determination of profit according to German GAAP, EU directive and according to IFRS
- Accruals accounting
- Cash effective and non-cash effective transactions, cash flow statements
- Annual reports
- Case study: Founding and closing of a firm over six periods, preparation of balance sheet, profit and loss accounts and cash flow statements for each period
- Weekly exercise session

**Literature:**

Will be specified at the beginning of the lecture.

**Additional remarks:**

No additional remarks.

<b>Bilanzierung</b>			
<b>Modulkürzel:</b>	Bilanz_WI	<b>SPO-Nr.:</b>	12
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 20/21)	Pflichtfach	2
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Albrecht, Tobias		
<b>Dozent(in):</b>	Albrecht, Tobias		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 5 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	12: Bilanzierung		
<b>Lehrformen des Moduls:</b>	SU/Ü - seminaristischer Unterricht/Übung		
<b>Prüfungsleistungen:</b>	12-Bilanzierung: schrP90 - schriftliche Prüfung, 90 Minuten		
	Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
<p>Nach der Teilnahme an der Modulveranstaltung erwerben die Studierenden folgende Fertigkeiten:</p> <ul style="list-style-type: none"> <li>• verstehen die theoretischen Grundlagen der Bilanzierung, der GuV- und Kapitalflussrechnung sowie des Jahresabschlusses.</li> <li>• sind befähigt, auf Basis einer Aufsatz-Bilanz und vorgegebener Geschäftsvorfälle eine Schlussbilanz aufzustellen und die GuV- und Kapitalflussrechnung anzufertigen.</li> <li>• können auf Basis eines Kontenrahmens und vorgegebener Geschäftsvorfälle Buchungssätze aufstellen und Buchungen in vorgegebenen T-Konten übertragen.</li> <li>• sind befähigt, eine Bilanz und eine GuV durch Restrukturierung sowie durch Bildung von Kennzahlen im vorgegebenen Rahmen zu analysieren.</li> </ul>			
<b>Inhalt:</b>			
<ul style="list-style-type: none"> <li>• Grundlagen der Bilanzierung</li> <li>• Gewinn- und Verlustrechnung sowie Ergebnisverwendung</li> <li>• Kapitalflussrechnung</li> </ul>			

- Grundzüge des Jahresabschlusses
- Fallstudie: Begleitung eines Unternehmens von der Gründung bis zur Schließung über sechs Perioden; Aufstellung von Bilanz, GuV, CF pro Periode anhand vorgegebener Geschäftsvorfälle
- Grundlagen der Buchführung
- Besondere Bilanzpositionen und besondere Bewertungsprobleme
- Jahresabschluss-Analyse

**Literatur:**

- COENENBERG, Adolf Gerhard und andere, 2021. *Einführung in das Rechnungswesen: Grundlagen der Buchführung und Bilanzierung*. Stuttgart: Schäffer-Poeschel Verlag. ISBN 978-3-7910-5093-5
- DEITERMANN, Manfred und andere, 2022. *Industrielles Rechnungswesen IKR: Finanzbuchhaltung, Jahresabschluss, Auswertung des Jahresabschlusses, Kosten- und Leistungsrechnung [Schülerband]*. 51. Auflage. Braunschweig: Westermann. ISBN 978-3-8045-7658-2, 3-8045-7658-3
- WEBER, Jürgen, WEIßENBERGER, Barbara E., 2021. *Einführung in das Rechnungswesen: Bilanzierung und Kostenrechnung* [online]. Stuttgart: Schäffer-Poeschel Verlag PDF e-Book. ISBN 978-3-7910-4784-3, 978-3-7910-4783-6. Verfügbar unter: <https://doi.org/10.34156/9783791047843>.

**Anmerkungen:**

Keine Anmerkungen.

<b>Production systems</b>			
<b>Module abbreviation:</b>	PRODSYS_EGM_E	<b>SPO-No.:</b>	11
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Meyer, Roland		
<b>Lecturers:</b>	Meyer, Roland		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	43 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	11: Production systems (PRODSYS_EGM_E)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical course		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (PRODSYS_EGM_E)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• know and use the specific terms.</li> <li>• can purchase production machines methodically.</li> <li>• get a survey about production machines and systems in assembly, logistics and manufacturing.</li> <li>• can decide about the productive application of technical elements in production.</li> <li>• can use the holistic view on industrial production systems as an economical overall system of equipment, organisation and humans.</li> <li>• know the basic ways of organizing and applying production systems</li> <li>• know and can decide about basic organizational forms in production and assembly.</li> <li>• can basically design logistic systems with components and organization.</li> <li>• know the state of the art of production systems in the overall process chain of production.</li> <li>• can solve tasks in designing production systems in teams and are able to present the results.</li> <li>• understand the dimensions and implications of sustainability and can apply them to organisation as well as to technology of production systems.</li> </ul>			

**Content:**

Introduction, basic terms, definitions

- Tasks of industrial engineering in production
- Processes in purchasing of technical equipment
- Applied research
- Types of tool machines
- History of tools machines, global situation
- Requirements for tool machines
- Elements and function of tool machines

Introduction to assembly technology

- Assembly systems, types and range of application
- Adapting assembly systems for different ranges of complexity / flexibility / production numbers
- Components of assembly systems, industrial robots, end effectors, sensors, safety in robotics
- Introduction in production logistics - tasks, objectives, concepts in technical and economical view
- Sustainable approaches in Production Systems – objectives and fields of action according to the Sustainable Development Goals of the UN
- Components and systems of transportation and handling in production and intralogistics
- Storage systems, basics of storing
- Order picking systems and organisation
- Excursions and case studies

**Literature:**

- FREIVALDS, Andris und Benjamin W. NIEBEL, 2014. *Niebel's Methods, standards, and work design*. 13. Auflage. New York, NY: McGraw-Hill. ISBN 978-0-07-337636-3, 0-07-337636-1
- KOETHER, Reinhard, 2007. *Technische Logistik*. München: Hanser. ISBN 978-3-446-40761-9, 3-446-40761-8
- MARTIN, Heinrich, 2016. *Transport- und Lagerlogistik: Systematik, Planung, Einsatz und Wirtschaftlichkeit*. 10. Auflage. Wiesbaden: Springer Vieweg. ISBN 978-3-658-14551-4, 3-658-14551-X
- HESSE, Stefan und Viktorio MALISA, 2020. *Grundlagen der Handhabungstechnik*. München: Hanser. ISBN 978-3-446-46335-6
- DANGELMAIER, Wilhelm, 1999. *Fertigungsplanung: Planung von Aufbau und Ablauf der Fertigung Grundlagen, Algorithmen und Beispiele* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-642-98045-9, 978-3-642-98046-6. Verfügbar unter: <https://doi.org/10.1007/978-3-642-98045-9>.
- GOLDRATT, Eliyahu M. und Jeff COX, 2016. *The Goal: A process of ongoing improvement*. Routledge: London and New York. ISBN 978-0-566-08664-9, 978-0-566-08665-6
- KROEMER, Karl H. E., Hiltrud J. KROEMER und Katrin E. KROEMER-ELBERT, 2020. *Engineering physiology: bases of human factors engineering/ergonomics*. Cham, Switzerland: Springer. ISBN 978-3-030-40626-4, 978-3-030-40629-5
- MAYNARD, Harold Bright und andere, 2001. *Maynard's industrial engineering handbook*. New York: McGraw-Hill. ISBN 0-07-144927-2, 978-0-07-041102-9
- TAYLOR, Frederick Winslow, 2019. *The principles of scientific management*. Boca Raton: CRC Press; Taylor & Francis Group.
- LIKER, Jeffrey K., 2020. *The Toyota way: 14 management principles from the world's greatest manufacturer*. New York [u.a.]: McGraw-Hill. ISBN 978-1-260-46851-9

**Additional remarks:**

Bonuspoints System:

In this lecture there may be tasks, which will lead to bonus points to the exams in case of good execution. At maximum 5 bonus points may be given.

Produktionstechnik			
<b>Modulkürzel:</b>	PRODTECH_WI	<b>SPO-Nr.:</b>	20
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 20/21)	Pflichtfach	4
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Axmann, Bernhard		
<b>Dozent(in):</b>	Feistle, Martin; Götz, Robert		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 4 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	43 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	20: Produktionstechnik		
<b>Lehrformen des Moduls:</b>	SU/Ü/Pr-seminaristischer Unterricht/Übung/Praktikum		
<b>Prüfungsleistungen:</b>	20-Produktionstechnik: schrP90 - schriftliche Prüfung, 90 Minuten		
	Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
Die Studierenden:			
<ul style="list-style-type: none"> <li>• kennen und verwenden die fachspezifische Terminologie sicher</li> <li>• können methodische Ansätze und Vorgehensweisen beim Maschineneinkauf anwenden</li> <li>• erfahren die unterschiedlichen produktionstechnischen Maschinen im industriellen Umfeld am Beispiel spanender und abtragender Bearbeitung</li> <li>• kennen wesentliche Themen zur digitalen Transformation der Produktion</li> <li>• kennen die wesentlichen Verfahren zum 3D Druck</li> <li>• verstehen und lösen Probleme beim Einsatz von produktionstechnischen Maschinen;</li> <li>• kennen sicherheitsrelevante Aspekte beim Betrieb automatisierter Produktionssysteme</li> <li>• beherrschen das ganzheitliche Betrachten der industriellen Produktion als wirtschaftliches Gesamtsystem aus produktionstechnischen Einrichtungen und Organisationsformen und Menschen</li> <li>• kennen die grundlegenden Organisationsformen in Produktion bzw. Montage und können sie je nach Einsatzbereich beurteilen und zuordnen</li> <li>• können Produktions- bzw. Montagesysteme grundlegend gestalten</li> </ul>			

- kennen wichtige Komponenten, Organisationselemente und Begriffe von Produktionssystemen; sie können sie spezifischen Bedingungen gemäss beurteilen und gestalten
- kennen wichtige Komponenten, Organisationselemente und Begriffe von Logistiksystemen; sie können für Produktions- wie Logistiksysteme den wirtschaftlichen Einsatz beurteilen
- kennen aus Industrieworkshops und Industrievorträgen den aktuellen technischen Stand der Produktionstechnik in der gesamten Prozesskette
- verstehen die Dimensionen von Nachhaltigkeit und können Sie auf Organisation wie Technik von Produktionssystemen anwenden

**Inhalt:**

- Einführung, Grundbegriffe, Begriffsdefinitionen
- Arbeitsgebiete der Wirtschaftsingenieure aus Sicht der Produktion
- Aufgaben des Technischen Einkaufs bei der Maschinenauswahl, Basis, Vorgehensweise, Fallbeispiel
- Typen von Werkzeugmaschinen
- Geschichtlicher Hintergrund, Entwicklung der Fertigungsqualität, Globale Situation der Werkzeugmaschinen
- Anforderungen an Werkzeugmaschinen
- Aufbau und Funktion von Werkzeugmaschinen, Einflüsse auf die Arbeitsgenauigkeit
- Baugruppen einer WZM
- Digitalisierung der Fabrik: Verfahren des 3D Drucks
- Exkursionen, Industrievorträge
- Einführung in die Montagetechnik
- Organisationsformen und Einsatzbereiche von Montagesystemen, technische und wirtschaftliche Anforderungen an Montagesysteme
- Einzelplatzmontage – Montagesysteme – Montagelinien und deren Eignung für unterschiedliche wirtschaftliche und technische Anforderungen
- Komponenten von Montagesystemen, z.B. Industrieroboter, Sensoren, Sicherheit
- Einführung in die Produktionslogistik: Aufgaben, Grundkonzepte, Ziele
- Nachhaltige Ansätze in Produktionstechnik und Produktionssystemen – Ziele und Handlungsfelder
- Innerbetrieblicher Transport – Systemgedanke, Fördertechnik und Umschlagsysteme aus technischer und wirtschaftlicher Sicht
- Lager- und Kommissioniersysteme – Kernelemente und Systemgedanken aus technisch-wirtschaftlicher und organisatorischer Sicht

**Literatur:**

- SCHNEIDER, Markus, 2021. *Lean factory design: Gestaltungsprinzipien für die perfekte Produktion und Logistik* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-46816-0. Verfügbar unter: <https://doi.org/10.3139/9783446468160>.
- DIETRICH, Jochen, RICHTER, Arndt, 2020. *Praxis der Zerspantechnik: Verfahren, Prozesse, Werkzeuge* [online]. Wiesbaden: Springer Vieweg PDF e-Book. ISBN 978-3-658-30967-1. Verfügbar unter: <https://doi.org/10.1007/978-3-658-30967-1>.
- SCHMIDT, Maximilian, 2022. *Praxisleitfaden Montageplanung: Grundlagen und Methoden der effizienten Gestaltung von Montagearbeitsplätzen* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-47359-1. Verfügbar unter: <https://doi.org/10.3139/9783446473591>.
- SPUR, Günter, *Handbuch der Fertigungstechnik*. München [u.a.]: Hanser.
- SPUR, Günter, 1996. *Die Genauigkeit von Maschinen: eine Konstruktionslehre*. München [u.a.]: Hanser. ISBN 3-446-18583-6
- REICHARD, Alfred, Werner GEISER und Willy SCHAL, Band 12016. *Fertigungstechnik*. 17. Auflage. Hamburg: Verl. Handwerk u. Technik. ISBN 978-3-582-02311-7
- KOETHER, Reinhard, RAU, Wolfgang, 2017. *Fertigungstechnik für Wirtschaftsingenieure* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-44990-9. Verfügbar unter: <https://doi.org/10.3139/9783446449909>.

- KOETHER, Reinhard, 2007. *Technische Logistik*. München: Hanser. ISBN 978-3-446-40761-9, 3-446-40761-8
- REICHARD, Alfred, Werner GEISER und Willy SCHAL, Band 21978. *Fertigungstechnik*. Hamburg: Verl. Handwerk u. Technik. ISBN 3-582-02313-3
- BRUINS, Dieko Hillebrands und Hans-Jürgen DRÄGER, *Werkzeuge und Werkzeugmaschinen für die spanende Metallbearbeitung*. München <<[u.a.]>>: Hanser.
- AWISZUS, Birgit, BAST, Jürgen, HÄNEL, Thomas, KUSCH, Mario, 2020. *Grundlagen der Fertigungstechnik* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-46066-9. Verfügbar unter: <https://doi.org/10.3139/9783446460669>.
- TÖNSHOFF, Hans Kurt, 1995. *Werkzeugmaschinen: Grundlagen* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-662-10914-4, 978-3-540-58674-6. Verfügbar unter: <https://doi.org/10.1007/978-3-662-10914-4>.
- LARGE, Rudolf, 2012-. *Betriebswirtschaftliche Logistik*. München: Oldenbourg Verlag.
- BICHLER, Klaus, 2010. *Beschaffungs- und Lagerwirtschaft: praxisorientierte Darstellung der Grundlagen, Technologien und Verfahren*. Wiesbaden: Gabler. ISBN 978-3-8349-1974-8, 3-8349-1974-8
- DANGELMAIER, Wilhelm, 2001. *Fertigungsplanung: Planung von Aufbau und Ablauf der Fertigung Grundlagen, Algorithmen und Beispiele* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-642-56453-6, 978-3-642-62652-4. Verfügbar unter: <https://doi.org/10.1007/978-3-642-56453-6>.
- TSCHÄTSCH, Heinz, 1996. *Praktische Betriebslehre: Lehr- und Arbeitsbuch* [online]. Wiesbaden: Vieweg+Teubner Verlag PDF e-Book. ISBN 978-3-663-07823-4, 978-3-528-13829-5. Verfügbar unter: <https://doi.org/10.1007/978-3-663-07823-4>.
- SCHULTE, Christof, 2017. *Logistik: Wege zur Optimierung der Supply Chain* [online]. München: Verlag Franz Vahlen PDF e-Book. ISBN 978-3-8006-5119-1. Verfügbar unter: <https://doi.org/10.15358/9783800651191>.
- TORKE, Hans-Joachim und Hans-Jürgen ZEBISCH, 1997. *Innerbetriebliche Materialflußtechnik: Funktion und Konstruktion förder technischer Einrichtungen und Geräte*. Würzburg: Vogel. ISBN 3-8023-1579-0
- MARTIN, Heinrich, 2021. *Technische Transport- und Lagerlogistik* [online]. Wiesbaden: Springer Fachmedien PDF e-Book. ISBN 978-3-658-34037-7. Verfügbar unter: <https://doi.org/10.1007/978-3-658-34037-7>.
- REFA, 1987. *Methodenlehre der Betriebsorganisation*. München: Hanser. ISBN 3-446-15057-9
- REFA, 2012. *REFA-Lexikon: Industrial Engineering und Arbeitsorganisation*. München: Hanser. ISBN 978-3-446-43408-0, 3-446-43408-9
- LOTTER, Bruno und Werner SCHILLING, 1994. *Manuelle Montage: Planung, Rationalisierung, Wirtschaftlichkeit*. Düsseldorf: VDI-Verl. ISBN 3-18-401244-1
- SCHMIDT, Maximilian, 1992. *Konzeption und Einsatzplanung flexibel automatisierter Montagesysteme* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-642-77217-7, 978-3-540-55025-9. Verfügbar unter: <https://doi.org/10.1007/978-3-642-77217-7>.
- HESSE, Stefan, MALISA, Viktorio, ALMANSA, Ana, 2016. *Taschenbuch Robotik - Montage - Handhabung* [online]. München: Hanser, Carl PDF e-Book. ISBN 978-3-446-44365-5, 3-446-44365-7. Verfügbar unter: <https://doi.org/10.3139/9783446445499>.
- PRÖPSTER, Markus Hubert, 2015. *Methodik zur kurzfristigen Austaktung variantenreicher Montagelinien am Beispiel des Nutzfahrzeugbaus*.
- BOYSEN, Nils, 2005. *Variantenfließfertigung*. Wiesbaden: Dt. Univ.-Verl. ISBN 3-8350-0058-6, 978-3-8350-0058-2
- SCHMIDT, Maximilian, 2022. *Praxisleitfaden Montageplanung: Grundlagen und Methoden der effizienten Gestaltung von Montagearbeitsplätzen* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-47359-1. Verfügbar unter: <https://doi.org/10.3139/9783446473591>.

**Anmerkungen:**

Bonussystem

In der Lehrveranstaltung können Aufgaben gestellt werden, die je entsprechend qualitativ bearbeiteter Aufgabe zu Bonuspunkten für die Prüfungsleistung führen.



<b>Start-up Project</b>			
<b>Module abbreviation:</b>	SuP_EGM_E	<b>SPO-No.:</b>	12
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	1
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Götz, Heike		
<b>Lecturers:</b>	Eberl, Sabine; Eisenberg, Andrea		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	48 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	12: Start-up Project (SuP_EGM_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	Project report (min. 5 pages excluding tables and graphs, font size 10-12 pt.) and a presentation (10-15 minutes) (SuP_EGM_E)		
	Examination requirements: Project work with following parts: <ul style="list-style-type: none"> <li>• presentation (oral)</li> <li>• research task (written form)</li> <li>• project paper (written form)</li> </ul> Mandatory participation		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
Students: <ul style="list-style-type: none"> <li>• understand how a company is structured.</li> <li>• know the contributions of key business functions and key interfaces among business functions in practice.</li> <li>• get an insight into practical work aspects.</li> <li>• are supported in self-study.</li> <li>• learn to use the university services and infrastructure.</li> <li>• learn to work in a academic manner.</li> <li>• learn how to work in a team.</li> </ul>			

<p>Dual students:</p> <p>After attending the lecture, the dual students reflected on the organization of their company and the contribution of functional roles in their company, particularly in the context of innovation processes. In addition, they have developed their personal and social skills and are, for example, able to handle simple managerial tasks within the framework of a project.</p>
<p><b>Content:</b></p> <p>Introduction:</p> <ul style="list-style-type: none"> <li>• Conduct the Management Simulation "TOPSIM" (in small teams)</li> </ul> <p>Project:</p> <ul style="list-style-type: none"> <li>• Company's organisational structures, contributions of business functions, interfaces</li> <li>• Elements of a business plan</li> <li>• Presentation techniques and student presentations</li> <li>• Research techniques (incl. documentation) and research task for students (E-learning course from teaching library)</li> <li>• Setup of a mock business plan (medium size teamwork for students)</li> </ul> <p>Dual students:</p> <p>Due to the practical experience gained in their partner company dual students are in a better starting position for achieving the learning objectives.</p> <p>In the context of the management simulation, they take leadership roles and thereby incorporate actively their practical experience. In the "lessons learned" part they additionally have the task to reflect the simulation compared to the real situation as in their company. Results are presented in a brief presentation at the annual shareholder meeting.</p> <p>In the project part they primarily work on strategic tasks for which they incorporate their knowledge, and their competencies acquired during their practical experience.</p>
<p><b>Literature:</b></p> <p><i>TOPSIM - General Management Participant Manual.</i></p>
<p><b>Additional remarks:</b></p> <p>Management Simulation "TOPSIM" takes place as a block in the first week of the semester. The project part takes usually fortnightly place. The dates are published in the timetable.</p> <p><b>SS 2025:</b> TOPSIM (2 SWS) as a block during the introductory week. Project part (3 SWS) fortnightly with 6 SWS.</p>



<b>Projekt Führung und Gründung von Unternehmen</b>			
<b>Modulkürzel:</b>	PFührGUntn_WI	<b>SPO-Nr.:</b>	6
<b>Zuordnung zum Curriculum:</b>	<b>Studiengang u. -richtung</b>	<b>Art des Moduls</b>	<b>Studiensemester</b>
	Wirtschaftsingenieurwesen (SPO WS 20/21)	Pflichtfach	1
<b>Modulattribute:</b>	<b>Unterrichtssprache</b>	<b>Moduldauer</b>	<b>Angebotshäufigkeit</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Modulverantwortliche(r):</b>	Götz, Heike		
<b>Dozent(in):</b>	Götz, Heike		
<b>Leistungspunkte / SWS:</b>	5 ECTS / 5 SWS		
<b>Arbeitsaufwand:</b>	Kontaktstunden:	47 h	
	Selbststudium:	48 h	
	Gesamtaufwand:	125 h	
<b>Lehrveranstaltungen des Moduls:</b>	6: Projekt Führung und Gründung von Unternehmen		
<b>Lehrformen des Moduls:</b>	SU/Ü - seminaristischer Unterricht/Übung		
<b>Prüfungsleistungen:</b>	6-Projekt Führung und Gründung von Unternehmen: LN - StA+Koll. (Studienarbeit mit Kolloquium), schriftlich 8-15 Seiten oder Präsentation 15-20 Seiten; mdl.Prfg 10-15 Min.		
	Weitere Erläuterungen: Keine		
<b>Verwendbarkeit für andere Studiengänge:</b>	Siehe die Fächeranerkennungsliste des SCS		
<b>Voraussetzungen gemäß SPO:</b>			
Keine			
<b>Empfohlene Voraussetzungen:</b>			
Keine			
<b>Angestrebte Lernergebnisse:</b>			
Die Studierenden können komplexe praxisorientierte Aufgabenstellungen über ein Semester hinweg erfolgreich bearbeiten und lösen. Insbesondere:			
<ul style="list-style-type: none"> <li>• setzen sich frühzeitig mit den Modulinhalten des eigenen Studienganges und deren Zielsetzungen auseinander.</li> <li>• erzielen einen durchgängigen exemplarischen Praxisbezug.</li> <li>• werden an teilautonomes Lernen herangeführt.</li> <li>• lernen, die Infrastruktur der Hochschule zu nutzen.</li> <li>• werden angeleitet zum selbständigen wissenschaftlichen Arbeiten.</li> <li>• bewältigen Problemstellungen im Team.</li> <li>• entwickeln soziale, methodische und fachliche Kompetenzen.</li> <li>• werden angehalten, Elemente des Projektmanagements aktiv anzuwenden.</li> </ul>			

- verstehen wie Unternehmen aufgebaut sein können und zu steuern sind.
- lernen an simulierten Realabläufen zu abstrahieren und sich in Berufsgruppen hineinzusetzen.

Für Dual-Studierende:

Nach dem Besuch der Veranstaltung "Projekt Führung und Gründung von Unternehmen" haben die Dual-studierenden die Organisation ihres Unternehmens und den Beitrag funktionaler Rollen ihres Unternehmens insbesondere im Kontext von Innovationsprozessen reflektiert. Darüber hinaus haben sie ihre Selbst- und Sozialkompetenzen ausgebaut und sind beispielsweise in der Lage, einfache Führungsaufgaben im Rahmen eines Projektes zu bewältigen.

#### Inhalt:

Einführungsteil:

- Planspiel TOPSIM General Management

Projektteil:

- Entrepreneurship
- Funktionale Rollen in einem Unternehmen / Projektteam
- Aufgabenbearbeitung in Kleingruppen
- Anwendung von Präsentationstechniken und -methoden
- Rechenschulung, Zitationsregeln
- Aufgabenbezogene Literaturrecherche und Dokumentation
- Schriftliche Dokumentation der Gruppenarbeit (Erstellung Projektbericht)

Für Dual-Studierende:

Aufgrund der bereits gesammelten Praxiserfahrung im Dual-Unternehmen haben Dual-Studierende eine bessere Ausgangsposition zur Erarbeitung der Lehrinhalte.

Sie übernehmen im Rahmen des Planspiels die Aufgaben der Projektleitung und bringen somit Ihre Praxiserfahrungen aktiv ein. Sie erfüllen innerhalb der „lessons learned“ zusätzlich die Aufgabe, die Spielsituation im Vergleich zur Praxissituation – wie sie sie aus den Dual-Unternehmen kennen – zu reflektieren und stellen die Ergebnisse in einer kurzen Präsentation im Rahmen der Hauptversammlung dar.

Im Projektteil bearbeiten sie primär strategische Aufgabenstellungen, bei denen sie ihr Wissen und bereits erworbenen Kompetenzen einbringen.

#### Literatur:

- 2012. *TOPSIM - General Management Teilnehmerhandbuch*. Version 13. Auflage
- WÖHE, Günter, Ulrich DÖRING und Gerrit BRÖSEL, 2020. *Einführung in die Allgemeine Betriebswirtschaftslehre*. 27. Auflage. München: Verlag Franz Vahlen. ISBN 978-3-8006-6300-2

#### Anmerkungen:

Studien- / Prüfungsleistungen:

Einführungsteil Planspiel TOPSIM (verpflichtende Teilnahme, Zulassungsvoraussetzung für Projektteil)

Projektarbeit (verpflichtende Teilnahme an Gruppenterminen) mit folgenden Bestandteilen:

- Referat (mündlicher Vortrag)
- Rechercheaufgabe (schriftliche Form)
- Projektbericht (schriftliche Form)

Hinweise zu den Vorlesungsterminen:

Das Planspiel TOPSIM ist Teil der Einführungswoche und findet im Block zu Semesterbeginn statt. Der Projektteil findet i.d.R. 14-tägig statt. Die genauen Termine können dem Stundenplan entnommen werden.

<b>Electrical Engineering</b>			
<b>Module abbreviation:</b>	EGM_ETEC_E	<b>SPO-No.:</b>	13
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attribute:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Haug, Thomas		
<b>Lecturers:</b>	Haug, Thomas		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self study:	67 h	
	Total workload:	125 h	
<b>Subjects of the module:</b>	13: Electrical Engineering (EGM_ETEC_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (EGM_ETEC_E)		
	Requirements: written exam, 90 minutes permitted aids: pocket calculator, not programmable any written documents (printed or handwritten)		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
Students: <ul style="list-style-type: none"> <li>• know and use specialist terminology confidently.</li> <li>• know the basic physical laws of electrical engineering and their connection.</li> <li>• know the boundary conditions of laws of physics.</li> <li>• can select the appropriate laws defining a given problem.</li> <li>• are proficient in calculations with appropriate units,</li> <li>• are proficient in methods calculating direct current and alternate current networks.</li> <li>• are proficient in methods calculating alternate current networks with the help of complex numbers.</li> <li>• know the electrical field quantities and can calculate them.</li> <li>• know the magnetic field quantities and can calculate simple magnetic circuits.</li> <li>• know the principles of semiconductor technology and of the most important electronic components.</li> </ul>			

<ul style="list-style-type: none"> <li>• can familiarise themselves with subjects regarding electrical engineering self-reliant and within a team and are able to discuss these matters competently,</li> </ul>
<b>Content:</b>
<ul style="list-style-type: none"> <li>• Direct current circuits: voltage, current, Ohm's law, energy, power, Kirchhoff's laws, Thevenin equivalent, Norton equivalent circuit, series connection, parallel connection, maximum power transfer, calculation of networks</li> <li>• Electric field: electric field quantities, capacitance, energy in the electrostatic field, forces in the electrostatic field, switching operations</li> <li>• Magnetic field: magnetic field quantities, coil inductance, magnetic circuit, magnetic flux law, magnetic energy of the coil, forces in the magnetic field, induction law, self-induction, switching operations</li> <li>• Alternating current circuit: sinusoidal change of electric quantities, circuit analysis of alternate current networks, power, frequency response, transformers</li> <li>• Three-phase system: star connection, delta connection, power, symmetrical load, asymmetrical load</li> <li>• Semiconductors: diode, transistor, operational amplifier, basics of electric circuits; digital circuits</li> <li>• Measuring electric quantities</li> </ul>
<b>Literature:</b>
<ul style="list-style-type: none"> <li>• HACKER, Viktor, SUMEREDER, Christof, 2020. <i>Electrical engineering: fundamentals</i> [online]. München; Wien: De Gruyter Oldenbourg PDF e-Book. ISBN 978-3-11-052111-5, 978-3-11-052113-9. Verfügbar unter: <a href="https://doi.org/10.1515/9783110521115">https://doi.org/10.1515/9783110521115</a>.</li> <li>• N. MAKAROV, Sergey, LUDWIG, Reinhold, BITAR, Stephen J., 2019. <i>Practical Electrical Engineering</i> [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-319-96692-2. Verfügbar unter: <a href="https://doi.org/10.1007/978-3-319-96692-2">https://doi.org/10.1007/978-3-319-96692-2</a>.</li> <li>• HAGMANN, Gert, 2020. <i>Grundlagen der Elektrotechnik: das bewährte Lehrbuch für Studierende der Elektrotechnik und anderer technischer Studiengänge ab 1. Semester</i>. 18. Auflage. Wiebelsheim: AULA-Verlag. ISBN 978-3-89104-830-6, 3-89104-830-0</li> <li>• TIPLER, Paul Allen und Gene MOSCA, 2008. <i>Physics for scientists and engineers</i>. New York: Freeman. ISBN 978-1-4292-0124-7, 1-4292-0124-X</li> </ul>
<b>Additional remarks:</b>
No additional remarks.

<b>Software Development</b>			
<b>Module abbreviation:</b>	SWD_EGM	<b>SPO-No.:</b>	14
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	3
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Schiendorfer, Alexander		
<b>Lecturers:</b>	Lodes, Lukas; Schiendorfer, Alexander		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	14: Software Development (SWD_EGM)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical courses		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (SWD_EGM)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students gain a practical understanding of the field of software development as an engineering tool to solve problems. After completing the module they are able to:</p> <ul style="list-style-type: none"> <li>• design, build, and test software applications using the Python programming language.</li> <li>• understand and document customer requirements and solve problems using coding/technology.</li> <li>• communicate the architecture of their software effectively to a team of software developers.</li> <li>• improve and debug existing code.</li> <li>• use automated tests to make sure the software is implemented correctly.</li> <li>• understand the need to work with other professionals, e.g. UX designer, graphic designer, product manager, technical writer.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Application areas of software development: mobile apps, web applications, tools for automation of repeating tasks, smart factories, artificial intelligence, etc.</li> <li>• The Python programming language</li> <li>• Variables, conditional statements, functions and code reuse</li> </ul>			



- Data structures: Lists, dictionaries
- Effective testing and debugging
- Object-oriented analysis & design (Inheritance, Polymorphism)
- Simple algorithms and an informal introduction to algorithmic complexity
- Development of user-friendly graphical user interfaces
- The whole software development process from analysis to testing

**Literature:**

- KLEIN, Bernd, 2021. *Einführung in Python 3: für Ein- und Umsteiger*. München: Hanser. ISBN 978-3-446-46556-5
- PILONE, Dan und Russ MILES, 2008. *Headfirst software development: [a brain-friendly guide]*. Beijing [u.a.]: O'Reilly. ISBN 0-596-52735-7, 978-0-596-52735-8
- FREEMAN, Eric und Elisabeth ROBSON, 2020. *Headfirst design patterns*. ISBN 978-1-492-07800-5

**Additional remarks:**

Bonus points system:

In lecture, there may be tasks and quizzes, which will lead to bonus points for the exam in case of good execution. At most 10% of the final grade can be improved via bonus points.

<b>Engineering Mechanics</b>			
<b>Module abbreviation:</b>	EngMECH_EGM	<b>SPO-No.:</b>	15
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	3
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Haug, Thomas		
<b>Lecturers:</b>	Haug, Thomas		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self-study:	67 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	15: Engineering Mechanics (EngMECH_EGM)		
<b>Lecture types:</b>	S/Pr-Seminar/Practical course		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (EngMECH_EGM)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• get knowledge in the effects of forces and moments.</li> <li>• can get to the root of static problems.</li> <li>• use equilibrium equations.</li> <li>• determine competent outer and inner load reactions.</li> <li>• solve friction problems.</li> <li>• estimate stresses, strains and deformations of bars and beams.</li> <li>• get insight in the theory of elasticity.</li> <li>• transfer their knowledge to the analytical strength assessment of components in mechanical engineering.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Introduction to the basics of statics (bars, beams, plates, etc., bearings and hinges, equilibrium conditions)</li> <li>• Central and common force systems, free-body diagram, moments</li> </ul>			

- Balance points, centroids
- Supporting structures
- Determinacy
- Truss structures
- Friction
- Definition of stresses and strains, deformation, stress state, Mohr's circle
- Linear elastic material law, elasticity theory
- Combined loading
- bending of beams, stress and deformation
- Torsion, stress and deformation
- Extensive examples and exercises for a competent application to engineering tasks

**Literature:**

- GROSS, Dietmar, HAUGER, Werner, SCHRÖDER, Jörg, WALL, Wolfgang A., BONET, Javier, Band 2[2018]. *Engineering mechanics* [online]. Berlin [u.a.]: Springer PDF E-Book. ISBN 978-3-662-56272-7. Verfügbar unter: <https://doi.org/10.1007/978-3-662-56272-7>.
- GROSS, Dietmar, GROSS, Dietmar, HAUGER, Werner. *Technische Mechanik, Band 1-4* [online]. PDF e-Book
- GROSS, Dietmar, 2017. *Statics – formulas and problems: engineering mechanics 1*. Berlin, Heidelberg: Springer. ISBN 978-3-662-53854-8
- HIBBELER, Russell C. und Jun Hwa LEE, 2023. *Engineering mechanics, statics*. Harlow, UK: Pearson. ISBN 1-292-44404-5, 978-1-292-44404-8
- KESSEL, Siegfried, FRÖHLING, Dirk, 2012. *Technische Mechanik: zweisprachiges Lehrbuch zu Grundlagen der Mechanik fester Körper = Engineering mechanics: bilingual textbook on the fundamentals of solid mechanics* [online]. Wiesbaden: Springer Vieweg PDF e-Book. ISBN 978-3-8348-2182-9. Verfügbar unter: <https://doi.org/10.1007/978-3-8348-2182-9>.
- GABBERT, Ulrich, RAECKE, Ingo, 2013. *Technische Mechanik für Wirtschaftsingenieure: mit 301 Abbildungen, 16 Tabellen, 83 Beispielen* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-43595-7, 978-3-446-43253-6. Verfügbar unter: <https://doi.org/10.3139/9783446435957>.
- HIBBELER, Russell C., 2018. *Mechanics of materials*. Harlow: Pearson. ISBN 978-1-292-17828-8

**Additional remarks:**

No additional remarks.

<b>Mechanical Design 2</b>			
<b>Module abbreviation:</b>	EGM_MDES2_E	<b>SPO-No.:</b>	16
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	3
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Tröber, Philipp		
<b>Lecturers:</b>	Tröber, Philipp		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	16: Mechanical Design 2 (EGM_MDES2_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	SA - Seminar paper with written elaboration (15-20 pages) and with oral examination (15min) and oral presentation (15-20 minutes) (EGM_MDES2_E)		
	Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• know the procedure of the systematic and method-based approach in product development.</li> <li>• understand the interrelationships between development and design and other departments of a developing and manufacturing company.</li> <li>• independently develop sophisticated products by applying the methods taught and using adequate working techniques.</li> <li>• understand the communication required for product development in a company.</li> <li>• apply the knowledge to be a functional and social member of a project team.</li> <li>• independently develop components and assemblies with the 3D CAD system CATIA (creation of models, creation of assemblies, derivation of standard-compliant drawings).</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Basic phases of the product development process</li> <li>• Requirement specification, functional specification, specification</li> </ul>			

- Abstraction
- Functional structures
- Search for solutions and creativity techniques to find solutions
- Systematic preparation of solution approaches (morphology) and variation as well as combination techniques
- Evaluation of concepts and concept selection
- Creation of technical drafts, draft construction
- Basic design rules, guidelines and principles
- Basic construction elements
- Semester exercise to implement the material learned
- Working with the 3D CAD system CATIA (component design, assembly design, drawing generation)

**Literature:**

PAHL, Gerhard, BEITZ, Wolfgang, WALLACE, Ken, 1996. *Engineering Design: A Systematic Approach* [online]. London: Springer London PDF e-Book. ISBN 978-1-4471-3581-4. Verfügbar unter: <https://doi.org/10.1007/978-1-4471-3581-4>.

**Additional remarks:**

Successful finalization of all CATIA certificates is compulsory to take part in the final exam.

<b>Power Engineering</b>			
<b>Module abbreviation:</b>	POWE_EGM	<b>SPO-No.:</b>	17
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Bschorer, Sabine		
<b>Lecturers:</b>	Bschorer, Sabine		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	17: Power Engineering (POWE_EGM)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical courses		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (POWE_EGM)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• know and can use the subject-specific terminology.</li> <li>• know the most important methods of energy conversion and their pros and cons.</li> <li>• acquire fundamental knowledge in thermodynamics (e.g. enthalpy, entropy, T-s-diagram, heat transfer) and fluid dynamics.</li> <li>• can calculate and evaluate cyclic processes.</li> <li>• can estimate the efficiency of different methods of power and heat generation.</li> <li>• develop sensibility regarding the social relevance and the environmental effects of the different energy technologies.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• The actual situation of energy supply</li> <li>• Influence on environment and climate</li> <li>• Thermal cycles for power and heat generation <ul style="list-style-type: none"> <li>○ Steam and gas turbine process</li> </ul> </li> </ul>			

- The combined cycle power plant
- Combined heat and power plant
- Use of nuclear power
- Basics of renewable energy
- Hydropower; wind power; biomass; solar energy
- Storage of energy

**Literature:**

- DEMIREL, Yaşar, 2016. *Energy: Production, Conversion, Storage, Conservation, and Coupling* [online]. Cham: Springer International Publishing PDF E-Book. ISBN 978-3-319-29650-0, 978-3-319-29648-7. Verfügbar unter: <https://doi.org/10.1007/978-3-319-29650-0>.
- QUASCHNING, Volker, 2016. *Understanding renewable energy systems*. London and New York: Routledge. ISBN 978-1-138-78194-8, 978-1-138-78196-2

**Additional remarks:**

No additional remarks.

<b>Cost Accounting</b>			
<b>Module abbreviation:</b>	COSTA_EGM	<b>SPO-No.:</b>	18
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	3
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Eisenberg, Andrea		
<b>Lecturers:</b>	Eisenberg, Andrea		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	18: Cost Accounting (COSTA_EGM)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (COSTA_EGM)		
	Requirements:	None	
<b>Usability for other study programs:</b>	None		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>Students</p> <ul style="list-style-type: none"> <li>• know and use the specific terms of cost accounting.</li> <li>• understand the purpose of cost accounting and the difference between financial accounting and cost accounting.</li> <li>• can classify cost by nature of cost, by traceability of cost and by cost behaviour.</li> <li>• can prepare a simple calculation of inventory, COGS and price based on a blanket rate.</li> <li>• can perform an allocation and apportionment of overhead cost with a cost allocation sheet based on absorption costing and can calculate departmental overhead rates based on the results.</li> <li>• can calculate the unit cost based on different versions of process costing and based on different versions of job order costing.</li> <li>• understand the concept of variable costing and the meaning of the contribution margin.</li> <li>• understand how variable costing is applied to make a short-term decision and can solve a real-life case based on contribution analysis, can apply economies of scale, can prepare a break-even analysis, can determine product portfolios and can make manufacturing process decisions.</li> </ul>			



<ul style="list-style-type: none"><li>• understand the importance of standard costing, can prepare a static and a flexible budget and can calculate and interpret different types of variances.</li><li>• understand the meaning of comparative cost accounting.</li></ul>
<b>Content:</b>
<ul style="list-style-type: none"><li>• Difference between financial and cost accounting</li><li>• Classification of cost according to nature, traceability and behaviour</li><li>• Absorption costing: blanket rate, allocation and apportionment of overhead cost with cost allocation sheet, process costing, job order costing with plant-wide allocations rate, departmental overhead rate and machine hour rates</li><li>• Variable costing: contribution margin, direct costing, multi-step contribution analysis, decision making with contribution margin, economies of scale, pricing decisions, break-even analysis, product mix, production process selection</li><li>• Standard costing: purpose of standard costing, static and flexible budget, variance analysis</li><li>• International comparison of accounting applications</li><li>• Casework</li></ul>
<b>Literature:</b>
Will be specified at the beginning of the lecture.
<b>Additional remarks:</b>
No additional remarks.

<b>Marketing</b>			
<b>Module abbreviation:</b>	EGM_MKT_E	<b>SPO-No.:</b>	19
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Schwandner, Gerd		
<b>Lecturers:</b>	Schwandner, Gerd		
<b>Credit points / SWS:</b>	5 ECTS / 5 SWS		
<b>Workload:</b>	Contact hours:	58 h	
	Self-study:	67 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	19: Marketing (EGM_MKT_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (EGM_MKT_E)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students:</p> <ul style="list-style-type: none"> <li>• Understand marketing and market-oriented management, as well as key marketing concepts such as customer satisfaction, purchase behaviour, market segmentation and positioning.</li> <li>• Understand the relationship between business strategy, marketing plan (esp. market segmentation and positioning) and marketing-mix.</li> <li>• Can analyse markets, conduct a market segmentation and select viable target markets.</li> <li>• Comprehend how market mix policies (product, price, place, promotion) work and interact with each other (integrated marketing).</li> <li>• Know key marketing tools in theory and practice.</li> </ul> <p>For dual students</p> <p>Dual students are invited to bring their experiences and current marketing topics from their partner companies into the discussion in the respective chapters of the class. In this way, they learn to transfer theoretical methods into the practice of their partner companies.</p>			

**Content:**

- Marketing fundamentals: customer orientation, purchase behaviour of consumers, purchase behaviour of organizations, customer relationship management, differences in B2B versus B2C marketing
- Key terms and tools of business strategy
- Market research, market segmentation, target market definition, positioning and differentiation
- Product policy, incl. innovation, brand management, after-sales management
- Price (and terms and conditions), incl. price determination process, price-demand-function, price differentiation and modification, value-pricing
- Distribution policy, incl. sales channels, push vs. pull, vertical marketing systems, multichannel sales, introduction to retail and wholesale business
- Communications (Promotion), incl. advertising, sales promotion, public relations, personal selling, direct marketing
- Selected marketing topics, e.g. e-commerce, internet marketing, viral marketing

**Literature:**

- KOTLER, Philip und Kevin KELLER, 2019. Marketing Management. 15. Auflage. Boston: Pearson. ISBN 978-1-292-09262-1

**Additional remarks:**

No additional remarks.

<b>Business Information Systems</b>			
<b>Module abbreviation:</b>	BusinfSyst_EGM	<b>SPO-No.:</b>	20
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Zehbold, Cornelia		
<b>Lecturers:</b>	Zehbold, Cornelia		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	20: Business Information Systems (BusinfSyst_EGM)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical courses		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (BusinfSyst_EGM)		
	Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
Computer sciences			
<b>Objectives:</b>			
<p>The module "Business Information Systems" provides students with contents and challenges of Business Informatics and gives insights into current developments in business practice.</p> <p>Students</p> <ul style="list-style-type: none"> <li>• can assess contents, objectives, and challenges of information systems in the business world (focus is on the design, implementation, management, and control of information and communication technology [ICT] as well as on the management of interfaces between systems and companies).</li> <li>• can distinguish between different types of information and communication systems.</li> <li>• earn in-depth knowledge about requirements for the effective and efficient use of ICT as well as about the importance of information systems for company success in the context of the increasing digitalization of the economy and society.</li> <li>• can solve business problems in the field of information systems by applying systematic approaches.</li> </ul> <p>Note: A detailed breakdown of the workload (total 125 h) will be given in the first lecture. The exercises include web-based training and by identifying alternative solutions in teams.</p>			

**Content:**

- The importance of information systems
- IT infrastructures and web technologies
- Databases and information management
- Operational information processing (ERP, SCM, CRM, etc.)
- E-procurement and e-commerce
- Business process management
- IT-enabled knowledge management
- Green IT
- IT-enabled decision making
- E-Society and political/legal aspects of information systems
- Applications and case studies: information systems in business practice
- Digitization of the economy and society

**Literature:**

- LAUDON, Kenneth C. und Jane Price LAUDON, 2022. *Management information systems: managing the digital firm*. Harlow, England: Pearson. ISBN 978-1-292-40357-1
- LAUDON, Kenneth C., Jane Price LAUDON und Detlef SCHODER, 2016. *Wirtschaftsinformatik: eine Einführung*. Hallbergmoos: Pearson Deutschland. ISBN 978-3-86326-765-0

**Additional remarks:**

## Bonus system:

In the course exercises are held that lead to a bonus point for the examination depending on the quality of the solution. The maximum of bonus points is based on APO.

## Study abroad:

Similar subjects are offered at many partner universities abroad. In English-speaking countries, they are offered under the title "Business Information Systems", "Management Information Systems" or simply "Information Systems".

<b>Controlling</b>			
<b>Module abbreviation:</b>	EGM_CONTR_E	<b>SPO-No.:</b>	21
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Eisenberg, Andrea		
<b>Lecturers:</b>	Eisenberg, Andrea		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	21: Controlling (EGM_CONTR_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (EGM_CONTR_E)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>Students</p> <ul style="list-style-type: none"> <li>• know and use specific terms of cost and management accounting.</li> <li>• understand the difference and similarities in controlling and management accounting.</li> <li>• understand the meaning of strategic management and the role of management accounting.</li> <li>• understand the process of strategy formulation, implementation and evaluation and can apply it to real life cases.</li> <li>• understand the meaning of the costing approaches target costing and activity-based costing and can apply them to cases.</li> <li>• understand the meaning of different key financial indicators and can calculate and interpret them.</li> <li>• understand the difference between value-based and profitability ratios and can explain them based on the example of the ratio EVA.</li> <li>• understand the investment process and can calculate investment appraisals based on static and dynamic methods.</li> </ul>			

<ul style="list-style-type: none"><li>• know the different budgeting methods and can apply them to cases, in detail can prepare a static and a flexible budget, can prepare a detailed variance analysis and can calculate the elements of the working capital life cycle.</li><li>• can solve case studies by applying the knowledge acquired in the class.</li></ul>
<b>Content:</b>
<ul style="list-style-type: none"><li>• Controlling and Management accounting</li><li>• Strategic management and management accounting</li><li>• Strategy formulation, implementation and evaluation</li><li>• Modern costing approaches: Target Costing and Activity-based costing</li><li>• Investment appraisal: Static and dynamic methods</li><li>• Key Financial indicators, value-based and profitability ratios</li><li>• Budgeting, budgeting process, static and flexible budgets, working-life cycle</li><li>• Case studies</li></ul>
<b>Literature:</b>
Will be specified at the beginning of the lecture.
<b>Additional remarks:</b>
No additional remarks.

<b>Selected topics in International Management</b>			
<b>Module abbreviation:</b>	EGM_STIM_E	<b>SPO-No.:</b>	22
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Schwandner, Gerd		
<b>Lecturers:</b>	Eisenberg, Andrea; Schwandner, Gerd		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	22: Selected topics in International Management (EGM_STIM_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	mdlP - oral exam, 15-20 minutes (EGM_STIM_E)		
	Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>International Management part</p> <p>The students</p> <ul style="list-style-type: none"> <li>Understand key terms and challenges in conduction international business.</li> </ul> <p>Are aware of the environment that multinational enterprises face, incl. cultural differences, political influence, foreign exchange.</p> <ul style="list-style-type: none"> <li>Comprehend how companies proceed to internationalize, esp. which options are available along this way.</li> </ul> <p>Transfer Pricing part:</p> <p>The students</p> <ul style="list-style-type: none"> <li>know and apply the relevant terms.</li> <li>understand the structure of international firms, can explain the concept of subsidiaries and permanent establishments.</li> <li>know the concept of cross-border transfer prices and the arm's length principle and can apply it to real life cases.</li> </ul>			



<ul style="list-style-type: none"> <li>• understand the basic concept of international taxation of company profits and can calculate the global tax rate of a group.</li> <li>• can select the appropriate transfer pricing method for a given business transaction and can calculate the transfer price and the resulting profit of each involved entity.</li> <li>• understand the meaning and content of a transfer pricing documentation.</li> <li>• know how to structure a transfer pricing system for specific transactions especially service provision and financing transactions.</li> <li>• can develop a transfer pricing structure and select the appropriate transfer pricing methods for several case study.</li> </ul>
<p><b>Content:</b></p> <p>International Management part:</p> <ul style="list-style-type: none"> <li>• Introduction: globalization, international business, scenarios going forward</li> <li>• Environment: cultural, political &amp; legal, economical, society ethics</li> <li>• Trade and investment: trade theory, governmental influence, cross-national cooperation and agreements (bilateral, regional, global), the European Union, other regional trade blocs</li> <li>• Foreign exchange: FX markets and instruments, the IMF, exchange-rate regimes, the Euro, business impact of FX rates</li> <li>• Strategy and structure: international strategy analysis, country evaluation and selection, export-import, collaboration - direct investment, organization of international business</li> </ul> <p>Transfer Pricing part:</p> <ul style="list-style-type: none"> <li>• International taxation of company profits and global tax rate</li> <li>• Definition of transfer prices, cross-border transactions and the arm's length principle</li> <li>• Types of intercompany cross-border transactions</li> <li>• Transfer pricing methods and comparability issues</li> <li>• Transfer pricing documentation</li> <li>• Intercompany service provision and financing</li> <li>• Case work: development of cross border transfer pricing system</li> </ul>
<p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>• DANIELS, John D., Lee H. RADEBAUGH und Daniel P. SULLIVAN, 2013. <i>International Business</i>. 14. Auflage. Harlow: Pearson. ISBN 978-0-273-76695-7</li> <li>• HOLLENSSEN, Svend, 2014. <i>Global Marketing</i>. Harlow: Pearson. ISBN 978-0-273-77316-0</li> </ul>
<p><b>Additional remarks:</b></p> <p>No additional remarks.</p>

<b>Intercultural Studies</b>			
<b>Module abbreviation:</b>	IntCult_EGM	<b>SPO-No.:</b>	24
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	6
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	McDonald, James		
<b>Lecturers:</b>	McDonald, James		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	24: Intercultural Studies (IntCult_EGM)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	(IntCult_EGM) StA - Seminar paper Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
At the end of the course students will be able to:			
<ul style="list-style-type: none"> <li>• know relevant theories of culture and intercultural communication.</li> <li>• solve case studies related to intercultural communication (e.g. management styles, corporate cultures).</li> <li>• apply theory, case study content in a variety of chosen contexts (determined by participants).</li> <li>• understand culture and its effects on communication in self and others.</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Introduction to relevant theories of culture and intercultural communication</li> <li>• Examination of case studies related to intercultural communication (e.g. management styles, corporate cultures)</li> <li>• Application of theory, case study content in a variety of chosen contexts (determined by participants, for example)</li> <li>• Seminar discussions, reading and writing exercises related to course material</li> </ul>			
<b>Literature:</b>			
Will be specified at the beginning of the lecture.			

<b>Additional remarks:</b>
No additional remarks.

<b>Project</b>			
<b>Module abbreviation:</b>	PROJ_EGM	<b>SPO-No.:</b>	25
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	6
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	winter and summer term
<b>Responsible for module:</b>	Meintrup, David		
<b>Lecturers:</b>	Akgün, Ertan; Alagoezlue, Mert; Haug, Thomas; Navarro Gevers, Daniel; Schiendorfer, Alexander		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	25: Project (PROJ_EGM)		
<b>Lecture types:</b>	P-Project		
<b>Examinations:</b>	(PROJ_EGM) PA - Project work Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>Students work one semester on their own responsibility on a self-contained, complex task. They are able to:</p> <ul style="list-style-type: none"> <li>• tackle complex tasks as a team during one semester.</li> <li>• quickly acquaint themselves with new topics and challenges.</li> <li>• analyse, break down and solve topics which include both engineering as well as commercial aspects, leveraging methods and tools learnt during their basic studies.</li> <li>• apply project management methods and work successfully together as team.</li> <li>• structure and prioritize problems and create relevant solutions to the satisfaction of the project sponsor.</li> <li>• apply soft skills and methods such as communication, teamwork, leadership, creativity techniques, conflict management and time management.</li> <li>• convincingly discuss, present and document their project's results.</li> </ul> <p>For dual students:</p>			

Due to their broader practical experience and the application of theoretical contents in their companies, after passing the module dual students are capable to deal with more depth with the project task and to solve more complex problems. An increased methodological and social competency leads to a deeper understanding of team processes.

**Content:**

- A given topic will be tackled by a team during one semester
- Topics differ from semester to semester. Typically, students select a topic out of a given list of topics.
- Topics are typical interdisciplinary, engineering & management challenges with practical relevance.

**Literature:**

- HEMMRICH, Angela, HARRANT, Horst, 2015. *Projektmanagement: in 7 Schritten zum Erfolg* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-44733-2, 978-3-446-44620-5. Verfügbar unter: <https://doi.org/10.3139/9783446447332>

**Additional remarks:**

For dual students:

- Dual partner companies are invited to bring in project topics which are worked on by their dual students. Potentially, non-dual students can participate in these projects if capacity allows for this.
- It is possible to do projects in the practical phase, given the content-wise suitability. The process of recognition and grading follows the standard credit transfer process documented in the guideline.

<b>Automation Technologies</b>			
<b>Module abbreviation:</b>	AUT_EGM	<b>SPO-No.:</b>	26
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	3
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Großmann, Daniel		
<b>Lecturers:</b>	Großmann, Daniel		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	26: Automation Technologies (AUT_EGM)		
<b>Lecture types:</b>	SU/Ü/Pr-Lecture with exercises and practical courses		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (AUT_EGM)		
	Requirements:	None	
<b>Usability for other study programs:</b>	None		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
The students			
<ul style="list-style-type: none"> <li>• have a basic understanding of automation technology</li> <li>• recognise automation potential and the demand for automation</li> <li>• have a basic understanding of information and communication technology in automation systems</li> </ul>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Basics of industrial process and control</li> <li>• Sensors and actuators</li> <li>• Automation controller</li> <li>• Programming of automation controllers (with exercise)</li> <li>• Operation and monitoring</li> <li>• Industrial communication</li> <li>• Development of automation systems</li> </ul>			

<b>Literature:</b>
Will be specified at the beginning of the lecture.
<b>Additional remarks:</b>
No additional remarks.

<b>Production Planning and Logistics</b>			
<b>Module abbreviation:</b>	EGM_PPL_E	<b>SPO-No.:</b>	27
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	4
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Jattke, Andreas		
<b>Lecturers:</b>	Jattke, Andreas		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	46 h	
	Self-study:	79 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	27: Production Planning and Logistics (EGM_PPL_E)		
<b>Lecture types:</b>	SU/Ü-Lecture with exercises		
<b>Examinations:</b>	schrP90 - written exam, 90 minutes (EGM_PPL_E)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students</p> <ul style="list-style-type: none"> <li>• will understand the challenges of production planning in different branches and sizes of industry.</li> <li>• will know about the different tasks and results of long-, mid- and short-term production planning.</li> <li>• will understand and are able to adapt the different production planning philosophies push/pull.</li> <li>• will be able to design themselves their own production planning tool considering enterprise-specific needs.</li> <li>• will know and understand the different tools of production control methodologies and are able to adapt these methodologies on the specific circumstances in production companies.</li> <li>• will know and adopt important KPI's to control the success of production planning methodologies.</li> <li>• will be able to adapt the production planning methodologies in the whole supply chain including external customers and suppliers.</li> <li>• will know the meaning of PPS systems in line with digitalisation in industry 4.0.</li> </ul> <p>For dual students:</p>			



Dual students have reflected experiences from their partner companies in the light of the learned methods of production planning and logistics. They are capable to explain their application in concrete practice examples from their partner companies. Additionally, they are able to analyze and judge the method of production planning implemented in their partner company.
<b>Content:</b>
<ul style="list-style-type: none"><li>• PPS Systems / MRP II</li><li>• Kanban</li><li>• Utilisation oriented order release system (BOA)</li><li>• Cumulative quantities concept</li><li>• Optimized Production Technology</li><li>• Frozen Period planning</li><li>• Integration of PPS in ERP/CIM and Industry 4.0, Digitalisation of the production planning methodologies</li><li>• Inventory management systems and their KPI's</li><li>• Production programme planning</li><li>• Quantity Planning</li><li>• Scheduling</li><li>• Different examples from industry</li></ul>
<b>Literature:</b>
Will be specified at the beginning of the lecture.,
<b>Additional remarks:</b>
Dual students are invited to bring in different elements of production planning and logistics from their partner companies into the module. In this way they transfer the competencies acquired in class to the reality of their companies.

<b>Bachelor Thesis Seminar</b>			
<b>Module abbreviation:</b>	EGM_BSEM_E	<b>SPO-No.:</b>	29
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Eisenberg, Andrea		
<b>Lecturers:</b>			
<b>Credit points / SWS:</b>	3 ECTS / 2 SWS		
<b>Workload:</b>	Contact hours:	23 h	
	Self-study:	52 h	
	Total effort:	75 h	
<b>Subjects of the module:</b>	29.1: Bachelor Thesis Seminar (EGM_BSEM_E)		
<b>Lecture types:</b>	S-Seminar		
<b>Examinations:</b>	LN - participation without/with success (EGM_BSEM_E)		
	Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students:</p> <ul style="list-style-type: none"> <li>• practice methods of scientific work.</li> <li>• are enabled to conduct systematic literature research.</li> <li>• compile a clear structure and high-level table of content for their thesis.</li> <li>• conduct expert discussions about the structure and storyline of their thesis.</li> </ul> <p>Dual students additionally acknowledge the regulations of their partner company regarding the preparation of a scientific work. They must ensure that the topic and the structure of their thesis is agreed between their advisor in the company and the supervising professor at the university.</p>			
<b>Content:</b>			
<p>Introduction</p> <ul style="list-style-type: none"> <li>• Scientific and methodological requirements</li> <li>• Relevant formal regulations</li> </ul>			

<ul style="list-style-type: none"><li>• Methods of research and documentation (incl. introduction by the library)</li></ul> Identification of a topic Getting started and organizing, including: <ul style="list-style-type: none"><li>• Getting in contact with companies</li><li>• Designing a project plan</li><li>• Defying a structure / high-level table of content</li><li>• Registration of the thesis</li></ul>
<b>Literature:</b>
Will be specified at the beginning of the lecture.
<b>Additional remarks:</b>
No additional remarks.

<b>Bachelor Thesis</b>			
<b>Module abbreviation:</b>	EGM_BTHESIS	<b>SPO-No.:</b>	29
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	7
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Eisenberg, Andrea		
<b>Lecturers:</b>			
<b>Credit points / SWS:</b>	12 ECTS / 0 SWS		
<b>Workload:</b>	Contact hours:	0 h	
	Self-study:	300 h	
	Total effort:	300 h	
<b>Subjects of the module:</b>	29.2: Bachelor Thesis (EGM_BTHESIS)		
<b>Lecture types:</b>	BA-Bachelor Thesis		
<b>Examinations:</b>	Bachelor-Thesis (EGM_BTHESIS)		
	Requirements: None		
<b>Usability for other study programs:</b>	None		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<ul style="list-style-type: none"> <li>• By completing their bachelor thesis, students shall demonstrate the ability to analyse and solve an engineering and/or management related topic using scientific methods within an appropriate timeframe.</li> <li>• Students shall apply scientific engineering and/or management methods. The student shall work self-dependent and solve the given problem in a structured and creative manner.</li> <li>• The topic of the thesis shall preferably be a practical topic provided by a company.</li> <li>• The bachelor thesis work is supervised by a THI professor. The thesis work will be accompanied by two evaluators, one of whom being responsible for the appraisal.</li> <li>• The bachelor thesis shall comprise a workload of approximately 300 hours.</li> </ul>			
For dual students, the following additional objectives exist:			
<ul style="list-style-type: none"> <li>• Dual students can analyse a problem present in their partner company using scientific methods and to propose a solution.</li> <li>• By presenting their thesis, dual students show that they are capable of presenting and defending their work in a way suitable for management.</li> </ul>			

<b>Content:</b>
Bachelor thesis For dual students, the following constraint holds: The Bachelor thesis must be written in cooperation with the partner company. The student finalizes the topic together with his/her advisor at the company. Results are presented to the dual partner and the supervising professor.
<b>Literature:</b>
Will be specified at the beginning of the course.
<b>Additional remarks:</b>
No additional remarks.

<b>Internship</b>			
<b>Module abbreviation:</b>	EGM_INTSHIP_E	<b>SPO-No.:</b>	30
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	5
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only winter term
<b>Responsible for module:</b>	Schneider, Yvonne		
<b>Lecturers:</b>			
<b>Credit points / SWS:</b>	24 ECTS / 0 SWS		
<b>Workload:</b>	Contact hours:	0 h	
	Self-study:	600 h	
	Total effort:	600 h	
<b>Subjects of the module:</b>	30: Internship (EGM_INTSHIP_E)		
<b>Lecture types:</b>	Pr-Internship		
<b>Examinations:</b>	PrB-Internship report (EGM_INTSHIP_E)		
	Requirements: Internship report to describe content, character and key learnings of internship. Based on SPO practical studies semester must be completed in a non-German speaking foreign country.  Alternatively, the practical studies semester may be completed in German-speaking countries if a connection to international business is guaranteed (e.g., through work in the areas of international product management, global product development, international marketing, international production and logistics).		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
Students <ul style="list-style-type: none"> <li>• get an introduction to engineering related tasks by means of a specific scope of work.</li> <li>• get acquainted with technical and managerial processes in a company.</li> </ul> Dual students do their internship at their partner company. They benefit from their broader and deeper previous practical experience and from their knowledge of the company and work on more challenging topics. A systematic reflection of the linking of study contents and practice at the company in the context of the internship takes place.			

**Content:**

- Participation in company projects or activities which are either related to the respective study programme or which complement the contents of the study programme
- Application and enhancement of knowledge, methods and procedures, which have been learned as part of the study programme.

According to §18 (5) APO dual students do their internships at their partner company. In their internship report they report on the linking between study program and practical experiences.

**Literature:**

Will be specified at the beginning of the semester.

**Additional remarks:**

- The internship can only be conducted in companies which are approved.
- The qualifications of the supervisor should be on the same level as the degree of the respective study programme.
- Universities and associated organisations are not permitted to host internships
- The practical studies semester must be completed in a non-German speaking foreign country.
- Alternatively, the practical studies semester may be completed in German-speaking countries if a connection to international business is guaranteed (e.g. through work in the areas of international product management, global product development, international marketing, international production and logistics).

<b>Seminar</b>			
<b>Module abbreviation:</b>	EGM_SEM_E	<b>SPO-No.:</b>	31
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	3
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	winter and summer term
<b>Responsible for module:</b>	Meintrup, David		
<b>Lecturers:</b>	Bednarz, Martin; Dern, Peter; Huber, Sina; Oelker, Martin; Pelzel, Robert		
<b>Credit points / SWS:</b>	2 ECTS / 2 SWS		
<b>Workload:</b>	Contact hours:		23 h
	Self-study:		27 h
	Total effort:		50 h
<b>Subjects of the module:</b>	31: Seminar (EGM_SEM_E)		
<b>Lecture types:</b>	S-Seminar		
<b>Examinations:</b>	LN - participation without/with success (EGM_SEM_E)		
	Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<ul style="list-style-type: none"> <li>• Application and deepening of technical competencies.</li> <li>• Teaching social, methodological skills (e.g. moderating, presenting).</li> <li>• Use of alternative teaching and learning platforms.</li> <li>• Understanding of complex interrelationships.</li> <li>• Implementation of a task in a team.</li> <li>• Mastering problems in a team.</li> <li>• Playful experience of simulated real processes.</li> </ul>			
<b>Content:</b>			
3-day block course on job-oriented competencies, e.g. team-oriented decision-making TOPSIM, excursions, workshops, seminars, continuing education courses, key qualifications (moderation, presentation, conflict management, rhetoric, etc.).			



<b>Literature:</b>
Will be specified at the beginning of the semester.
<b>Additional remarks:</b>
Examination performance. Performance record for the active participation in the 3-day seminar. Evaluation "with success" (m. E.) / "without success" (o. E.).

<b>Project- and Quality-Management</b>			
<b>Module abbreviation:</b>	PQM_EGM	<b>SPO-No.:</b>	32
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Compulsory Subject	6
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Pelzel, Robert		
<b>Lecturers:</b>	Ens, Hermann		
<b>Credit points / SWS:</b>	4 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	53 h	
	Total effort:	100 h	
<b>Subjects of the module:</b>	32: Project- and Quality-Management (PQM_EGM)		
<b>Lecture types:</b>	SU/Ü-lecture with exercises		
<b>Examinations:</b>	LN - written exam, 90 minutes (PQM_EGM)		
	Requirements:	None	
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
<p>The students will be able to plan and run industrial and engineering projects and get a fundamental knowledge about quality management as well as ISO 9001 principles.</p> <p>For dual students:</p> <p>Dual students have reflected experiences from their partner companies in the light of the learned methods and are capable to demonstrate the practical application of the methods in concrete practical examples from their companies.</p>			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Project kick-off procedures</li> <li>• Relevant project organisation, RFQ, Func Spec.</li> <li>• Setting right project goals, SMART</li> <li>• Planning of actions, WBS, GANTT, MPM, CPM, CP</li> <li>• Starting project work and controlling, BEA, EV, MS-Trends</li> <li>• Organizing acceptance tests</li> <li>• Project review and lessons learned</li> </ul>			

- Basics of quality management
- ISO 9001 and other standards
- TQM, EQA, LEP
- Main tools, FMEA, QFD, SPC, BCG
- Lean six sigma

Dual students are encouraged to bring in case studies from their partner companies. These are processed by the lecturers and will be worked on by students in group work.

**Literature:**

Will be specified at the beginning of the semester.

**Additional remarks:**

Exam condition:

Successful participation with presence duty in the lessons.

## 5.2 Foreign Languages

<b>Chinesisch A1</b>			
<b>Module abbreviation:</b>	SZ_CHIN_A1	<b>SPO-No.:</b>	6
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Foreign Languages	
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Responsible for module:</b>	Chen, Jing		
<b>Lecturers:</b>	Chen, Jing		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	6: Chinesisch A1 (SZ_CHIN_A1)		
<b>Lecture types:</b>	SU/Ü-Seminaristischer Unterricht/Übung		
<b>Examinations:</b>	LN - schriftliche Prüfung, 90 Minuten (SZ_CHIN_A1)		
	Requirements: Keine		
<b>Usability for other study programs:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Prerequisites according examination regulation:</b>			
Keine			
<b>Recommended prerequisites:</b>			
Keine			
<b>Objectives:</b>			
Die Studierenden (ohne Vorkenntnisse) lernen in diesem Kurs die Phonetik (Pinyin) und die chinesischen Schriftzeichen. Neben den Redewendungen zu den alltäglichen Themen wie z.B. Essen bestellen, Auskunft über sich und die Familie werden auch kulturelle Aspekte durch Fallbeispiele vermittelt.			
<b>Content:</b>			
<ul style="list-style-type: none"> <li>• Sich vorstellen</li> <li>• Nationalität</li> <li>• Zeitangaben</li> <li>• Restaurantbesuch</li> <li>• Einkaufen</li> <li>• Familien</li> <li>• Redemittel am Telefon</li> <li>• Arztbesuch</li> <li>• Freizeitaktivitäten</li> <li>• Wetter</li> </ul>			

**Literature:**

ZHU, Xiaoxing, 2011. *Chinesisch erleben: Leben in China*. Beijing: Higher Education Press. ISBN 978-7-04-019054-0

**Additional remarks:**

Keine weiteren Anmerkungen.

<b>English for Business and Engineering 2</b>			
<b>Module abbreviation:</b>	EnglBusiness2_EG	<b>SPO-No.:</b>	6
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	General Elective Subject	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	English	1 semester	only summer term
<b>Responsible for module:</b>	Reicherstorfer, Anja		
<b>Lecturers:</b>	Reicherstorfer, Anja		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	6: English for Business and Engineering 2 (EnglBusiness2_EG)		
<b>Lecture types:</b>	SU/Ü-Lecture with integrated exercises		
<b>Examinations:</b>	LN - written exam, 90 minutes (EnglBusiness2_EG)		
	Requirements: None		
<b>Usability for other study programs:</b>	Please see the subject recognition list of SCS.		
<b>Prerequisites according examination regulation:</b>			
None			
<b>Recommended prerequisites:</b>			
None			
<b>Objectives:</b>			
At the end of the semester, students will:			
<ul style="list-style-type: none"> <li>• improve their business English and technical English skills.</li> <li>• increase vocabulary, comprehension, speaking and writing skills.</li> <li>• gain confidence and fluency in handling everyday business situations.</li> </ul>			
The course has a special focus on writing in different situations.			
<b>Content:</b>			
Communication Skills			
<ul style="list-style-type: none"> <li>• Negotiations</li> <li>• Interviews</li> <li>• Managing difficult conversations</li> </ul>			
Writing Skills			
<ul style="list-style-type: none"> <li>• Different Types of Reports</li> <li>• Letters and emails</li> <li>• Different Types of Academic Writing</li> </ul>			

**Literature:**

- DUBICKA, Iwonna, 2019. *Business Partner B2+: Coursebook*. Hallbergmoos: Pearson Education. ISBN 978-3-86894-814-1, 978-3-86894-813-4
- BOYLE, Mike und Lindsay WARWICK, 2014. *Skillful Level 4: Reading and Writing; Student's Book with Digibook access*. München: Hueber Verlag. ISBN 978-3-19-422576-3, 3-19-422576-6

**Additional remarks:**

No additional remarks.



<b>Französisch A1</b>			
<b>Module abbreviation:</b>	SZ_FRANZ_A1	<b>SPO-No.:</b>	6
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Foreign Languages	
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Responsible for module:</b>	Reicherstorfer, Anja		
<b>Lecturers:</b>	Abdallah, Zahra		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:		47 h
	Self-study:		78 h
	Total effort:		125 h
<b>Subjects of the module:</b>	6: Französisch A1 (SZ_FRANZ_A1)		
<b>Lecture types:</b>	SU/Ü-seminaristischer Unterricht/Übung		
<b>Examinations:</b>	LN - schriftliche Prüfung, 90 Minuten (SZ_FRANZ_A1) Requirements: Keine		
<b>Usability for other study programs:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Prerequisites according examination regulation:</b>			
Keine			
<b>Recommended prerequisites:</b>			
Keine			
<b>Objectives:</b>			
Studierende können die einfachsten Situationen des Alltags bewältigen z.B. sich anderen vorstellen, ihr Umfeld beschreiben (wohnen, arbeiten, Freizeit), Events organisieren (einladen, Meetings, einkaufen, ausgehen), francophone Länder kennenlernen, Internet benutzen.			
<b>Content:</b>			
Studierende lernen die Aussprache, das Vokabular und die Grundgrammatik der Sprache und wenden diese in einem realen Umfeld an. Zeiten: Présent, Futur Proche, Impératif, Passé composé, Conditionnel, Einführung ins Subjonctif. 'Determinanten, Fragen stellen, Pronomen, Zeitangaben und Zahlen, Nebensätze.			
<b>Literature:</b>			
<ul style="list-style-type: none"> <li>SCHREITMÜLLER, Fabienne, 2017. <i>Langenscheidt fit in 30 Tagen - Französisch: Niveau A1-A2: der schnelle Sprachkurs mit Buch, 2 Audio-CDs und Audio-Wortschatztrainer auf 1 MP3-CD: Lernkalender mit Tipps vom Coach und Trainingsplan</i>. München, Wien: Langenscheidt. ISBN 978-3-468-28029-0</li> <li>GRÉGOIRE, Maia, 2015. <i>Grammaire progressive du français: niveau débutant complet; avec 200 exercices</i>. Paris: CLE International / SEJER. ISBN 978-209-038156-6, 978-3-12-529948-1</li> </ul>			
<b>Additional remarks:</b>			
Mindestteilnehmerzahl 8 Studierende.			

<b>German A2 Intensive</b>			
<b>Module abbreviation:</b>	GermanA2_EG	<b>SPO-No.:</b>	6
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Allgemeines Wahlpflichtfach	2
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	Deutsch	1 Semester	Winter- und Sommersemester
<b>Responsible for module:</b>	Reicherstorfer, Anja		
<b>Lecturers:</b>	Donovan, Elke		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	6: German A2 Intensive (GermanA2_EG)		
<b>Lecture types:</b>	SU/Ü-seminaristischer Unterricht/Übung		
<b>Examinations:</b>	LN - schriftliche Prüfung, 90 Minuten (GermanA2_EG)		
	Requirements:	Keine	
<b>Usability for other study programs:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Prerequisites according examination regulation:</b>			
Keine			
<b>Recommended prerequisites:</b>			
Students have completed level A1.			
<b>Objectives:</b>			
<p>Students are able to</p> <ul style="list-style-type: none"> <li>• deal with everyday situations in Germany</li> <li>• understand information (weather, family, how to plan your vacation)</li> <li>• express and represent their own opinion</li> <li>• compare things</li> <li>• be polite and hand out advice</li> <li>• Improve communication skills, speaking and writing skills</li> </ul>			
<b>Content:</b>			
<p>Acquisition of fundamental language concepts allowing students to express themselves simply and coherently on familiar topics of personal interest (about subjective experiences, events, dreams, hopes, objectives).</p> <p>Grammar:</p> <ul style="list-style-type: none"> <li>• passive voice</li> </ul>			

- prepositions (local, modal, temporal)
- modal verbs, separable verbs, subjunctive II
- reflexive verbs (accusative, dative)
- past tense (Perfekt, Präteritum)
- declension of adjectives, adjectives of degree
- prefixes
- adverbs
- infinitive clause, reported questions, subordinate clause, relative clause, conjunctions
- pronouns (possessive, demonstrative)
- cases (genitive, dative, accusative)
- Reading and Listening Comprehensions
- essay writing (e-mail)
- role plays

**Literature:**

- KRENN, Wilfried und Herbert PUCHTA, 2015. *Motive: Kompaktkurs DaF: Deutsch als Fremdsprache. Kursbuch*. München: Hueber Verlag.
- KRENN, Wilfried und Herbert PUCHTA, 2016. *Motive: Kompaktkurs DaF: Deutsch als Fremdsprache: Arbeitsbuch, Lektion 1–30: A1, A2, B1*. München: Hueber Verlag. ISBN 978-3-19-031878-0, 3-19-031878-6
- SZITA, Szilvia und Anne BUSCHA, *Begegnungen, Deutsch als Fremdsprache, Integriertes Kurs- und Arbeitsbuch, Sprachniveau A2+*. ISBN 978-3-929526-89-9

**Additional remarks:**

Students have completed level A1.

<b>Spanisch A1</b>			
<b>Module abbreviation:</b>	SZ_SPAN_A1	<b>SPO-No.:</b>	6
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Foreign Languages	
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	Deutsch	1 Semester	nur Wintersemester
<b>Responsible for module:</b>	Cots Paltor, Agnès		
<b>Lecturers:</b>	Benito Miranda, Ana Maria		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	6: Spanisch A1 (SZ_SPAN_A1)		
<b>Lecture types:</b>	SU/Ü`-seminaristischer Unterricht/Übung		
<b>Examinations:</b>	LN - schriftliche Prüfung, 90 Minuten (SZ_SPAN_A1)		
	Requirements: Keine		
<b>Usability for other study programs:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Prerequisites according examination regulation:</b>			
Keine			
<b>Recommended prerequisites:</b>			
Keine			
<b>Objectives:</b>			
Die Studierenden kennen die Grundlagen der spanischen Sprache (Vokabular, Stilistik und Grammatik) und sind mit landeskundlichen Elementen vertraut			
<b>Content:</b>			
Vokabular:			
<ul style="list-style-type: none"> <li>• sich vorstellen, sich begrüßen und verabschieden, nach persönlichen Daten nachfragen;</li> <li>• Charakter und Aussehen</li> <li>• Berufe, Nationalitäten und Familie</li> <li>• Ortsangaben und die Stadt beschreiben</li> <li>• die Zahlen</li> <li>• Datum, Wochentage und Monaten</li> <li>• Zeitangaben, einen Tagesablauf schildern</li> <li>• Hobbys und Vorlieben: sagen, was dir gefällt oder nicht</li> <li>• Über das Wetter sprechen</li> </ul>			

- einen Termin ausmachen (ablehnen oder akzeptieren), Pläne für das Wochenende
- Kleidung und Farben
- in der Bar, Essen und Trinken
- Allgemeine Konzepte im Bereich Wirtschaftsspanisch
- usw.

**Grammatik:**

- das Alphabet und die Aussprache
- Singular und Plural von Nomen / die bestimmten und unbestimmten Artikel
- die Verneinung
- die Subjektpronomen und die regelmäßigen, unregelmäßigen und reflexiven Verben im Präsens
- die Possessivbegleiter
- die Fragewörter
- Dativ- und Akkusativpronomen → Verben mit Dativpronomen: gustar, interesar, encantar, ...
- das Futur: über die Pläne sprechen
- Vergleichsformen
- das Perfekt
- usw.

**Literature:**

XICOTA TORT, Núria und Encarnación GUERRERO GARCÍA, 2023. *Universo.ele intensivo A1/A2: Spanisch für Studierende/Kurs- und Arbeitsbuch plus interaktive Version*. München: Hueber Verlag. ISBN 978-3-19-154333-4, 3-19-154333-3

**Additional remarks:**

Mindestteilnehmerzahl 8 Studierende.

<b>Spanisch A2</b>			
<b>Module abbreviation:</b>	SZ_SPAN_A2	<b>SPO-No.:</b>	6
<b>Curriculum:</b>	<b>Programme</b>	<b>Module type</b>	<b>Semester</b>
	Engineering and Management (SPO SS 15)	Foreign Languages	
<b>Module attributes:</b>	<b>Language of instruction</b>	<b>Duration of module</b>	<b>Frequency of offer</b>
	Deutsch	1 Semester	nur Wintersemester
<b>Responsible for module:</b>	Cots Paltor, Agnès		
<b>Lecturers:</b>	Antràs Solè, Teresa		
<b>Credit points / SWS:</b>	5 ECTS / 4 SWS		
<b>Workload:</b>	Contact hours:	47 h	
	Self-study:	78 h	
	Total effort:	125 h	
<b>Subjects of the module:</b>	6: Spanisch A2 (SZ_SPAN_A2)		
<b>Lecture types:</b>	SU/Ü-Seminaristischer Unterricht/Übung		
<b>Examinations:</b>	LN - schriftliche Prüfung, 90 Minuten (SZ_SPAN_A2)		
	Requirements:	Keine	
<b>Usability for other study programs:</b>	Siehe die Fächeranerkennungsliste des SCS.		
<b>Prerequisites according examination regulation:</b>			
Keine			
<b>Recommended prerequisites:</b>			
Keine			
<b>Objectives:</b>			
<p>Kann Sätze und häufig gebrauchte Ausdrücke verstehen, die mit Bereichen von ganz unmittelbarer Bedeutung zusammenhängen (z.B. Informationen zur Person und zur Familie, Einkaufen, Arbeit, nähere Umgebung). Kann sich in einfachen, routinemäßigen Situationen verständigen, in denen es um einen einfachen und direkten Austausch von Informationen über vertraute und geläufige Dinge geht. Kann mit einfachen Mitteln die eigene Herkunft und Ausbildung, die direkte Umgebung und Dinge im Zusammenhang mit unmittelbaren Bedürfnissen beschreiben. Aspekte aus dem Bereich Wirtschaft Spanisch werden ebenfalls gesehen.</p> <p>Dieser Kurs erreicht das Niveau A2 des Gemeinsamen Europäischen Referenzrahmens für Sprachen (CEFR).</p>			
<b>Content:</b>			
<p>Grammatik:</p> <p>Mengeangaben, lokale Präpositionen, Komparativ, betonte Possessivpronomen, Demonstrativpronomen, direkte und indirekte Objekpronomen, Imperativ, Indefinido, Wiederholung des Pretérito Perfecto, wertende Verben, temporale Präpositionen, Konnektoren zur zeitlichen Einordnung des Geschehens, historisches Präsens, Pretérito Imperfecto, Adverbien auf -mente, Substantivierung von Verben, Konnektoren in</p>			

einer Erzählung, estaba+Gerundio, vorübergehende Zustände mit estar+Adjektiv, Konditionalsätze mit "si", Imperativ, Empfehlungen geben.

Vokabular

- Wohnungen und Räume
- Abteilungen in einem Kaufhaus, Produkte, Konsumverhalten
- Gegenstände beschreiben
- Wichtige Dokumente (Reisepass, Versicherung...)
- Studienbegleitende Auslandsaufenthalte
- Vokabular für eine Biografie
- Beschreibung des Aussehens
- Kindheitserinnerungen
- Mode und Kleidung
- Materialien, Muster und Formen
- Ereignisse in der Vergangenheit
- Aufbau von Städten
- Formulierungen für formelle Briefe
- Gemütszustände
- Sportarten
- Körperteile
- Empfindungen
- Nahrungsmittel und Ernährung
- Themenbereich Kochen
- Lebenslauf, persönliches Gespräch und Bewerbungsschreiben

**Literature:**

XICOTA TORT, Núria und Encarnación GUERRERO GARCÍA, 2023. *Universo.ele intensivo A1/A2: Spanisch für Studierende/Kurs- und Arbeitsbuch plus interaktive Version*. München: Hueber Verlag. ISBN 978-3-19-154333-4, 3-19-154333-3

**Additional remarks:**

Mindestteilnehmerzahl: 8 Studierende.

### 5.3 Electives in Engineering and Management

Starting with winter semester 2024/25, there is a separate module handbook for the descriptions of the elective modules, which is part of the semester curriculum for the bachelor's degree program "Engineering and Management". This can be also found on the Moodle page of your degree program under Modulhandbuch EGM.

**Note:** Please note that not all modules listed in the module handbook for electives can be selected for your degree program or specialization. The current list of selectable modules for your degree program or specialization can be found in Moodle under: General Information Faculty of Engineering and Management/Information on electives. Link: <https://moodle.thi.de/mod/folder/view.php?id=213758>