# Course Descriptions General Engineering – Winter Semester 2023/24

30 June 2023

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# German A1/ Parts 3 and 4

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<tr>
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<td>Course with exercises</td>
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<td><strong>SWS</strong></td>
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<tr>
<td><strong>Semester</strong></td>
<td>Winter and Summer</td>
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<tr>
<td><strong>Workload in hours</strong></td>
<td>60 hrs</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Dr. Virginia Wallner</td>
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</tbody>
</table>

## Course objectives
- Can understand and use familiar expressions and very basic phrases aimed at meeting concrete everyday needs
- Can introduce themselves and others and ask other people questions about their person
- Can communicate in a simple way if the other person speaks slowly and clearly and is willing to help

[http://www.europaeischer-referenzrahmen.de](http://www.europaeischer-referenzrahmen.de)

## Course contents
- **Grammar**
  - Prepositions
  - Possessives
  - Dative verbs
  - The imperative-Simple past ‘war/ hatte’
  - The perfect form
  - Word formation
  - Subjunctive II
- **Topics**
  - Apartments and houses
  - Parts of the body
  - Describing people and their character
  - Household activities
  - Weather
  - Holidays and celebrations
|-----------------------------|--------------------------------------------------------------------------------------------------|
| **Teaching methods**        | • Partner and group work  
• Explanation of topics by the lecturer  
• Presentations and discussions  
• Feedback from the lecturer  
• Listening exercises |
| **Assessment method**       | Written examination, 90 min. |
| **Language of instruction** | German |
| **Prerequisites**           | Successful completion of Level A1/Parts 1 and 2 (88121) |

Course descriptions for German language courses at higher levels: [https://th-deg.de/en/students/language-electives#german](https://th-deg.de/en/students/language-electives#german)
English in Technical Contexts B2

<table>
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<tr>
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<td>SWS</td>
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<tr>
<td>Semester</td>
<td>Winter and summer</td>
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</table>

**Course level**

- Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization
- Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party
- Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options

http://www.europaeischer-referenzrahmen.de/

**Lecturer**

Neal O’Donoghue, MA

**Course objectives**

This course aims to deepen students’ encounter with the English language in a technical context by giving practical training in specialized vocabulary, grammar and language usage. The four cardinal language skills – listening, speaking, reading, and writing – will play an integral role in this training.

The course is designed to be relevant and interesting for engineering students and will be adapted to their learning needs and study areas.

By the end of the course, participants should have a more comprehensive understanding of, and enhanced fluency in, the English language in an engineering context.
## Course contents

**Obligatory topics (60%)**:
- Numbers and mathematical operations
- Shapes and dimensions
- August 2017
- Basic physics and the scientific worldview
- Materials and their properties
- Case study on an area related to technology
- /physics/engineering
- Grammar/ communication skills

**Variable content (40%)**:
Variable content will be determined on the basis of a student survey conducted in the first session. Current world events (including news events and popular culture) and recent technological innovations may be used as a basis for discussions.

## Teaching methods

Teaching methods focus on improving the four cardinal language skills and include group discussions and group projects; individual work; mini-presentations; role-plays; close reading and listening activities; dictation; grammar games; and various follow-up viewing and writing activities.

Work not completed in class should be done at home. Self-study assignments will be set on a weekly basis.

## Assessment method

**Written exam (60 min)**

No dictionaries are allowed.

Exam structure:
- Part 1: Listening comprehension(s)
- Part 2: Reading comprehension(s)
- Part 3: Vocabulary and technical content
- Part 4: Grammar (maximum 10% of total exam points, excluding writing exercise)
- Part 5: Writing composition (150-200 words)

The exam will be based on topics covered during the semester.

## Recommended Literature


<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>English</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>B1 / Abitur (A-levels/ school leaving certificate giving right of entry to higher education) / 7-9 years of English</td>
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# Intercultural Training for Germany and Bavaria

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
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<td><strong>Semester</strong></td>
<td>Winter and summer</td>
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<tr>
<td><strong>Workload in hours</strong></td>
<td>30 hours</td>
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<tr>
<td><strong>Name of Instructor</strong></td>
<td>Lisa Werner</td>
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## Course objectives
Participants get an understanding of the different theories of “culture” and learn about stereotypes and traditions in Bavaria. Furthermore, the participants get information on Germany and Bavaria as well as the Deggendorf Institute of Technology.

## Course contents
I. Culture (theories)  
II. Customs and Rituals in Germany/Bavaria  
III. Information on Germany and Bavaria and the DIT  
IV. Quiz and Presentation  
V. Culture Shock

## Recommended literature
Bolten J. und Ehrhardt C., Interkulturelle Kommunikation, Verlag Wissenschaft & Praxis 2003;  
Bolten J., Einführung in die interkulturelle Wirtschaftskommunikation, Vandenhoeck & Ruprecht 2007

## Teaching methods
1. Culture  
2. Customs and Rituals  
3. Information on Germany/Bavaria  
4. Culture Shock
Whereas hard facts are taught in a classical lecture style, students will do lots of role-plays, critical incidents, short movies and do a quiz.

<table>
<thead>
<tr>
<th><strong>Assessment method</strong></th>
<th>Paper</th>
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<tbody>
<tr>
<td><strong>Language of instruction</strong></td>
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<tr>
<td><strong>Prerequisites</strong></td>
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# Basics of International Sales and Business Development

<table>
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<tr>
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<tr>
<td><strong>ECTS</strong></td>
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<td><strong>Course type</strong></td>
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<td>Winter and summer</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Ibrahim Waked</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>General knowledge of international sales and strategic business development mechanisms. As well as profound analysis of practical case studies.</td>
</tr>
</tbody>
</table>
| **Course contents** | • Basics of sales and business development  
• Analysis of market potential including cultural & political aspects, correlation between microeconomic and demographic aspects, (PESTELO analysis)  
• Relevancy of world bank reports on general economic performance and their implementation in company BD strategy  
• Market entry and risk management |
| **Recommended literature** | **Strategic Management** by Richard Lynch von Pearson Longman  
**Business Development Management** By Lutz Becker, Walter Gora, Tino Michalski |
| **Teaching methods** | Lecture with integrated project development examples |
| **Assessment method** | Presentation and seminar paper |
| **Language of instruction** | English |
# Bavarian Culture

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<tr>
<th><strong>Course title</strong></th>
<th>Bavarian Culture</th>
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<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Jennifer Hauer</td>
</tr>
</tbody>
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## Course objectives
Participants get a deeper understanding of the traditional and contemporary Bavarian culture by integrating knowledge about customs, language, and history with culturally routed events.

## Course contents
1. Hard facts
   1.1. History
   1.2. Demographics
   1.3. Geography
2. Customs and rituals
   2.1. Traditional
   2.2. Contemporary
3. Language
4. Events

## Teaching methods
The course is organized according to four pillars:
1. Hard Facts
2. Customs and Rituals
3. Language
4. Events

Whereas hard facts are taught in a classical lecture style, students should experience aspects of the culture in a lively manner through knowledge dissemination of cultural experts, off-campus seminars at events of traditional cultural origin, as well as learning and engaging in cultural activities.
rituals themselves. The aim is to deepen and complement the contents taught in the Orientation Week.

<table>
<thead>
<tr>
<th>Recommended literature</th>
<th>Jonas, B., Gebrauchsanweisung für Bayern, Piper Verlag, 2007</th>
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<tr>
<td>Assessment methods</td>
<td>Seminar paper</td>
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<tr>
<td>Prerequisites</td>
<td>Participants should have attended the introductory Intercultural Training during the Orientation Week.</td>
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Business Storytelling

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<td><strong>Course type</strong></td>
<td>Elective</td>
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<td><strong>SWS</strong></td>
<td>2</td>
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<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
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<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 60 / In-class: 30 / Self-study: 30</td>
</tr>
<tr>
<td><strong>Lecturers</strong></td>
<td>Diego and Raphael Fiche</td>
</tr>
</tbody>
</table>

At the end of this course, students will be able to:

- Recognize key elements that go into persuasive storytelling
- Identify types of stories and their purposes
- Create compelling stories to achieve business goals
- Apply acquired knowledge to develop a compelling story to persuade others to think or act in a different way.

**Course contents**

- Introduction to Business Storytelling
- Power of Business Stories: when and why to tell them
- Types of Business Stories and Their Purposes
- Structuring Your Story to Engage the Audience
- Storytelling techniques
- Enhance Your Storytelling Skills

**Recommended literature**

Janis Forman (2013), Storytelling in Business: The Authentic and Fluent Organization

Seth Godin(2005), All Marketers Are Liars
| **Teaching methods** | Lectures  
|                     | Group work  
|                     | Case studies  
|                     | Presentation  
|                     | Exercises  
| **Assessment method** | Class workshops / presentation / case studies / seminar paper  
| **Language of instruction** | English  
| **Prerequisites** | None  

Cross-Cultural Team Building

Course title: Cross-Cultural Team Building Workshop

Lecturer: Prof. Dr. Johann Nagengast

Course type: Elective

SWS: 2

Semester: Winter and summer

ECTS: 2

Assessment method: Seminar paper

Course language: English

Course objectives:

Globalisation demands that managers possess the basic skills required to work together in international teams. Many companies actively encourage the development of these skills through teambuilding or team development programs. Especially for change management, team development plays an increasingly important role. Here the critical goal is to optimise how the group members work together as a team. Key factors affecting a team’s success include organisation, structures, processes, culture and relationships.

International Team Building is conducted at the beginning of the semester as a three day off-campus seminar. The hands-on, outdoor training gives the students intensive exposure to the multifaceted nature of group dynamics.

By working together to solve complex problems and through structured feedback sessions, the participants become sensitised to the roles they assume in group interactions, to the limitations imposed by the German and their own cultures, and to the conditions required for effective team work.
The course supports the integration of foreign students into campus and social life and helps build lasting working relationships among all participants.

The skills of giving and receiving of feedback are learned in the protective atmosphere of small groups through intensive exchanges between instructors and participants. This leads to improved observation and communication skills.

Moreover, the group members continually switch roles. This promotes a deeper understanding of social interaction, helps members to reflect on their contribution to the group process, encourages members to experiment with new behavioural concepts, and improves the group’s capacity to co-operate and perform. Final feedback rounds offer the possibility to align the members’ self-images with the perception others have of them, to reduce “blind spots”, to increase self-confidence and their ability to reflect.

The capacity to give appropriate feedback in various situations, to monitor one’s self image as well as the consequences of one’s own behaviour form the basis for a successful career in management.

Course contents

Group dynamics, processes and structures in groups; Roles in groups (roles in tasks and supporting roles); Group leadership; Effect of one’s actions in groups; The “give and take” of feedback; Self-image and how others see you; Communication levels (content versus relationship); Conditions for successful co-operation; Cultural influences on teamwork.

Note: The main emphasis of this course is not the conveyance of theoretical knowledge, but rather learning directly from experience. The theories on which the intervention and evaluation sessions are based are taught in the course “Human Resources Management”.

Teaching methods

This course is organised as an interactive experience and activity based training program. With the help of complex tasks, timed interaction activities combined with elements of surprise, classical outdoor training exercises, moderated feedback and reflection sessions, participants are taught the necessary conditions for effective teamwork.

The teaching methods are based on the principles of self-organised learning. The instructors define their roles in terms of Schein’s model of process consulting.
They intervene by questioning the participants in a manner designed not only to examine their perspectives, but to introduce new perspectives and stimulate the group's creative process.

The responsibility for these process remains with the participants.

In the context of the learning environment, the students enjoy the opportunity to increase their observation, communication, co-operation, self-reflection, teamwork and management skills as well as their self-confidence.

In addition, the course offers the students the chance to network and develop sustainable work relationships at the start of their studies.

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**Suggested Literature**

Baron, R. S.: Group Process, Group Decision, Group Action, 2nd Ed., Buckingham, 2003;


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**Miscellaneous**

The weekend seminar is characterised by team teaching in a mountain hostel. The team consists of Prof. Dr. Nagengast and trained tutors selected from participants in the course „Train the Trainer“. The tutors make it possible to conduct the training in small „protected“ groups (around 8) and to give qualified feedback.
Simplified Microcontroller Programming

<table>
<thead>
<tr>
<th>Course title</th>
<th>Simplified Microcontroller Programming</th>
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</thead>
<tbody>
<tr>
<td>ECTS</td>
<td>2</td>
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<tr>
<td>Course type</td>
<td>Lecture with practical exercises</td>
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<tr>
<td>SWS</td>
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<td>Semester</td>
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<tr>
<td>Lecturer</td>
<td>Johann Gerner</td>
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</table>

Course objectives

In almost all areas of technical installations, microcontrollers constitute the core of control and regulating engineering. By means of various university initiatives, systems have been developed that are both inexpensive and easy to program and therefore they are especially suitable for students who do not have an extensive basic knowledge in the field of electrical engineering. Based on the simple development system “Arduino”, students will learn how can be solved technical problems in the various engineering disciplines with the aid of software and hardware. Here, the handling of hardware-based programming is exercised and solution approaches are developed that are presented in the various sensors and actuators.

Course contents

- Introduction: presentation of the development system Arduino and its sub-systems
- Testing and analysis of existing sample programs under consideration of special problem cases
- Reading and implementing Fritzing diagrams and wiring diagrams
- Inclusion and application of external program libraries
- Application programming of different sensors and their characteristics
- Control of different actuators and introduction to the applied technology
| **Program development for simple measurement and control applications**  
| **Information about current development trends in microcontroller engineering**  

| **Recommended literature** | Massimo Banzi, Arduino für Einsteiger (2012); O'Reilly Simon Monk, Programming Arduino Next Steps: Going Further with Sketches |
| **Teaching methods** | Seminar-like lessons and practical tasks in the laboratory |
| **Assessment method** | Presentation of project results |
| **Language of instruction** | English |
| **Prerequisites** | Fundamentals of Informatics, experience with Windows |
# Introduction to Soil Mechanics

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
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<tbody>
<tr>
<td><strong>ECTS</strong></td>
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<tr>
<td><strong>Course type</strong></td>
<td>Lecture and exercises</td>
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<tr>
<td></td>
<td>Presentations</td>
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<td></td>
<td>Discussion</td>
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<td><strong>SWS</strong></td>
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<td><strong>Semester</strong></td>
<td>Winter and summer</td>
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<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr.-Ing. Parviz Sadegh Azar</td>
</tr>
</tbody>
</table>

## Course objectives

The objective of this course is to introduce the subject of soil mechanics and provide the basics of geotechnical engineering. Some of the important topics that students will learn during the course: soil structure and grain size; identification and classification of soils for engineering purposes; physical and engineering properties of soils; fundamental behaviour of soils subjected to various forces; groundwater and seepage through soils; compaction; consolidation; shear strength; and bearing capacity of soils. Students will get acquainted to several geotechnical problems and documentation of geotechnical observations. Upon successful completion of the course, students should be able to apply fundamentals of soil mechanics and principles of geotechnical engineering in the analysis, design, and construction of civil engineering projects.

## Course contents

The subject will give an introduction to:

- Classification of soil materials
- Stresses and strain in soil
- Shear strength of soil
- Lateral earth pressure
- Primary settlement of soil and calculations
- Slope stability
- Bearing capacity of foundations
- Uplift and hydraulic failure
Recommended literature


B. M. Das, “Principles of Geotechnical Engineering”, PWS-KENT.


S. Prakash, “Fundamentals of Soil Mechanics”, S.P. Foundation


Teaching methods

This course is a comprehensive course of integrating theory and practice. For each of the above topics students will
• first understand the theoretical background (lecture),
• then the students get to solve a related problem (exercise),
• followed by practical application samples and further cases of using the theoretical background in practice.

Assessment method

Written examination, 90 min.

Language of instruction

English

Prerequisites

Mathematics
Introduction to Geotechnical Engineering

<table>
<thead>
<tr>
<th>Course title</th>
<th>Introduction to Geotechnical engineering</th>
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</thead>
<tbody>
<tr>
<td>ECTS</td>
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<tr>
<td>SWS</td>
<td>2</td>
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<tr>
<td>Semester</td>
<td>Winter and summer</td>
</tr>
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<td>Lecturer</td>
<td>Prof. Dr.-Ing. P. Sadegh Azar</td>
</tr>
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This unit of study aims to introduce you to the fundamentals and basic techniques used in Foundation Engineering. Specifically, it will provide you with the design and construction principles used in Foundation Engineering type structures such as earth retaining structures, sheet piles and shallow footings according to European standards (EC 7).

Some of the important topics that students will learn during the course:
1. Analyse earth retaining structures to determine active, passive and at rest lateral earth pressures (and associated forces).
2. Design the dimensions of retaining gravity and cantilever walls and assess the stability of these designed walls.
3. Determine the appropriate section of sheet piles and the depth of embedment, maximum moment, and the tension in tie rod in case of using anchored sheet piles.
4. Analyse bearing capacity of soils under shallow footings.
5. Design shallow footings based on dimensions, thickness, area and length.
6. The basics for determining the bearing capacities of single piles.

Students will get acquainted to several geotechnical problems and documentation of geotechnical problems. Upon successful completion of the course, students should be able to apply fundamentals of foundation engineering.
Civil and Construction Engineering
and Environmental Technology

and principles of geotechnical engineering in the analysis, design, and construction of civil engineering projects.

The subject will give an introduction to:

- Introduction to design according to EC 7
- Bearing capacity of foundations
- Excavation shoring methods
- Introduction to pile design
- Uplift and hydraulic failure
- Slope stability

Course contents

Recommended literature

B. M. Das, “Principles of Geotechnical Engineering”,


Bowles, Foundation Analysis and Design

Teaching methods

This course is a comprehensive course of integrating theory and practice. For each of the above topics, students will

- first understand the theoretical background (lecture),
- then the students get to solve a related problem (exercise),
- followed by practical application samples and further cases of using the theoretical background in practice

Assessment method

Written examination, 90 min.

Language of instruction

English

Prerequisites

Soil mechanics
## Lean Management

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Lean Management</th>
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<tbody>
<tr>
<td><strong>ECTS</strong></td>
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<tr>
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<td>Lecture</td>
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<tr>
<td><strong>SWS</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 150 / In-class: 60 / Self-study: 90</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr.-Ing. Gerd Maurer</td>
</tr>
</tbody>
</table>
| **Course objectives** | Basic understanding of LEAN MANAGEMENT  
Application of Last Planner System ® for Construction |
| **Course contents** | Lectures on LEAN MANAGEMENT  
Introduction into the Last Planner System ® Method  
Workshops for practical usage of LEAN MANAGEMENT methods  
Lean Project Delivery Practices in Construction |
| **Teaching methods** | Lecture / presentation / practical work in case studies |
| **Assessment method** | Assignment - Paper |
| **Language of instruction** | English |
| **Prerequisites** | None |
## Water Management

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Water Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Lecture</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 60</td>
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<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr. Wolfgang Rieger</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>tba</td>
</tr>
<tr>
<td><strong>Course contents</strong></td>
<td>tba</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>tba</td>
</tr>
<tr>
<td><strong>Teaching methods</strong></td>
<td>tba</td>
</tr>
<tr>
<td><strong>Assessment method</strong></td>
<td>tba</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>tba</td>
</tr>
</tbody>
</table>
# Selected Chapters of Control Engineering

<table>
<thead>
<tr>
<th>Course title</th>
<th>Selected Chapters in Control Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course ID</td>
<td>CM-15/CM 2115 Master Electrical Engineering and Information Technology</td>
</tr>
<tr>
<td>ECTS</td>
<td>5 ECTS</td>
</tr>
<tr>
<td>Course type</td>
<td>Lecture/ practical exercises</td>
</tr>
<tr>
<td>SWS</td>
<td>4 SWS</td>
</tr>
<tr>
<td>Semester</td>
<td>Winter</td>
</tr>
<tr>
<td>Workload in hours</td>
<td>Time of attendance: 60 hours self-study: 90 hours Total: 150 hours</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Prof. Dr. Müller</td>
</tr>
</tbody>
</table>

Students will be enabled to design suitable controllers and observers for challenging dynamic plants by means of the state-space method and implement it as a program.

The students achieve the following learning objectives:

**Professional Skills**

- They can formulate dynamic systems in state-space
- They name the most important properties and can calculate them
- They can compute controllers and observers for low system order according to the pole-placement method
- They can describe how observers work and what is their benefit
- They can determine a discrete time description of a plant
- They can implement a program for observer and controller
• They know how to depict a system description within Matlab/Simulink

Course contents

1. Description of dynamic systems in state space
   a. Physical Modelling
   b. Set-up of State-Space Description from Other Models
   c. Methods for Solution of the Differential Equations

2. Properties
   a. Stability
   b. Controllability and Observability
   c. Canonical Forms

3. Design of Controllers
   a. Pole-Assignment Method for SISO Systems
   b. Pole-Assignment Method for MIMO Systems
   c. Other Design Methods

4. Design of Observers

5. Discrete-time description

Recommended literature


Teaching methods

Blended Learning, tuition in seminars, exercises

Assessment method

Written examination, 90 min.

Language of instruction

English

Prerequisites

knowledge of the contents:
- Mathematics: Linear algebra, Laplace transformation, z-Transformation, statistics
- Control: Understanding of dynamic systems, description of dynamic systems in state space
Automotive Drive Systems

<table>
<thead>
<tr>
<th>Course title</th>
<th>Automotive Drive Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course ID</td>
<td>CM-17/ CM 2117 Master Electrical Engineering and Information Technology</td>
</tr>
<tr>
<td>ECTS</td>
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</tr>
<tr>
<td>Course type</td>
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</tr>
<tr>
<td>SWS</td>
<td>2</td>
</tr>
<tr>
<td>Semester</td>
<td>Winter</td>
</tr>
<tr>
<td>Workload in hours</td>
<td>Total: 60</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Prof. Dr. Müller</td>
</tr>
</tbody>
</table>

**Course objectives**
- Advanced knowledge in control methods of speed variable drive systems
- Design of a sensorless field oriented control
- Characterize features of different accumulator technologies
- Knowledge about necessary infrastructure steps for electrical power supply of vehicles

**Course contents**
- Power electronics control devices for electric machines
- Modeling of three phase AC machines
- Speed control of three phase AC machines (field oriented control)
- Storage devices for electrical energy
- Power supply for automotive applications
### Recommended literature

- Th. Becks et al.: Wegweiser Elektromobilität. VDE-Verlag, 2010

### Teaching methods

Lecture, forms of media used: blackboard, transparencies

### Assessment method

Written examination, 45 min.

### Language of instruction

English

### Prerequisites

Knowledge about basics of electric machines and power electronics

### Miscellaneous

Students can choose if they want to take part in the second part of the course (Industrial Drive Systems) as well (only possible upon request!). There is the possibility to write a complete exam (90 min.) or just one part of the exam (45 min.).
Advanced Circuits Lab

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Advanced Circuits Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Practical Exercises</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 150 / In-class: 60 / Self-study: 90</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Michael Benisch</td>
</tr>
</tbody>
</table>

In the subject Advanced Circuits Lab students obtain an insight into analogue electronic circuits. The students achieve the following learning objectives:

**Professional Skills:**

The students know and understand the functionality of different typical analogue electronics circuits. They understand the importance of the bias point and are able to dimension the bias point for various circuits. They can dimension and analyze the small signal behavior of semiconductor circuits as well as the transient behavior. They have the ability to analyze and apply analogue semiconductor circuits for AF and RF. The students know oscillator circuits and dimension and analyze them. The students have the ability to design analogue semiconductor circuits.

**Methodological Skills:**

The students are able to dimension and optimize electronic analogue circuits with the help of theoretical considerations and simulation. The students are able to differentiate between various circuits and can assess the
advantages and disadvantages of different amplifiers and oscillators. The students have the ability to independently research and develop existing basic knowledge. Students can evaluate the properties of electronic circuits by measurements.

**Soft Skills:**

Students are able to reasonably justify and critically evaluate the basic properties of analogue electronic circuits. In lab teams the students learn to substantiate their simulation and measurement results. The students are able to present and explain their measurement results and theoretical findings in a convincing, informative and comprehensible way.

**Course contents**

- **Lessons for introduction of specific topics**
  - Applications of analogue circuits
  - Diodes and Transistors
  - Amplifiers
  - RF circuits (Oscillators, PLL)

- **Lab Experiments**
  - optional: Introduction to circuit simulation
  - optional: Introduction to basic electronics measurement equipment
  - Diode circuits: voltage doubler (Villard and Greinacher circuit), voltage cascade, diode as switch
  - integrated circuits: Timer circuit NE555
  - Design of AF-amplifier according to specification
  - Differential amplifier: Characteristics, current source, application
  - Operational Amplifier
  - Quasi-linear AF-power-amplifier: Class A, B, AB operation, biasing, output power, efficiency
  - Phase locked loop ? PLL
  - RF-Oscillators: Phase-shift oscillator, Wien-bridge oscillator, Colpitts-oscillator, LC-oscillators, Franklin-oscillator
  - optional: RF-measurements: S-Parameter and time domain reflectometry
<table>
<thead>
<tr>
<th><strong>Recommended literature</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Teaching methods</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical work and lesson style lectures for introduction of specific topics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assessment method</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project and written examination (90 min.)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Language of instruction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Prerequisites</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Formally: <strong>Admission test</strong></td>
</tr>
<tr>
<td>Lab seats will be assigned based on the test. Content of the test: General basics of electrical engineering, basics of semiconductor devices, and basics of electronic networks.</td>
</tr>
<tr>
<td>In terms of content: Fundamentals of electrical engineering, basic knowledge of solid state devices (bipolar junction transistors, diodes), basics of electronic networks</td>
</tr>
</tbody>
</table>
Industrial Computed Tomography

<table>
<thead>
<tr>
<th>Course title</th>
<th>Industrial Computed Tomography</th>
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</thead>
<tbody>
<tr>
<td>ECTS</td>
<td>5</td>
</tr>
<tr>
<td>Course type</td>
<td>Lecture</td>
</tr>
<tr>
<td>SWS</td>
<td>4</td>
</tr>
<tr>
<td>Semester</td>
<td>Winter and summer</td>
</tr>
<tr>
<td>Workload in hours</td>
<td>Total: 150 / In-class: 60 / Self-study: 90</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Dr. Gabriel Herl</td>
</tr>
</tbody>
</table>

The course deals with industrial computed tomography (CT). In the subject "Industrial Computed Tomography", students learn how computed tomography works (starting with the generation of X-rays up to the 3D reconstruction of CT volumes), 2D and 3D image processing methods on CT data sets as well as concrete industrial applications of CT in practice.

The students achieve the following learning objectives:

Course objectives

The students will learn the structure and mode of operation of CT systems for the digitization of any objects, especially for industrial quality inspection:

- How does CT work?
- What can CT do?
- How is CT used?
- How is CT data processed and analyzed for industrial applications?
- Insight into industrial quality inspection and metrology.

Students will understand how CT systems work and, in particular, will be able to
• assess whether an object can be digitized with given CT systems
• perform a simple CT scan themselves
• assess the data quality and reliability of a CT scan
• explain and perform rudimentary data and image processing operations on CT data.

Course contents

Lecture:
- Fundamentals of 2D X-ray technology
- Basis of X-ray physics
- Structure of CT systems
- Fundamentals of signal and image processing
- Fundamentals of 3D X-ray computed tomography
- From 2D proj. to 3D volumes
- CT reconstruction
- CT imaging fidelity and correction methods
- Construction of application-specific special CT systems
- Image processing on CT data, esp. industrial metrology
- Applications of CT data (mainly industrial, but also elsewhere, e.g., in security and medicine)
- Comparison to other sensor technologies (e.g. ultrasound or thermography)

Practical part:
- Radiation protection instruction
- Execution of an own CT scan
- Evaluation of CT data for industrial application

Recommended Literature


<table>
<thead>
<tr>
<th><strong>Teaching methods</strong></th>
<th>Lecture, practical experiments in the CT laboratory as well as own study work with presentation in the seminar.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment method</strong></td>
<td>Seminar paper on a research-related, practice-relevant topic including own presentation.</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>None</td>
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</table>
Optical Metrology and Optical Sensors

**Course title**  
Optical Metrology and Optical Sensors

**ECTS**  
5

**Course type**  
Lecture

**SWS**  
4

**Semester**  
Winter

**Workload in hours**  
Total: 150 / In-class: 60 / Self-study: 90

**Lecturer**  
Prof. Dr. Jens Ebbecke

This course will give the students an overview of the application driven field of optical metrology with optical sensors. After completing the subject, the students have achieved the following learning objectives: They are able to explain the specialities of the optical sensors used for distinct optical metrology fields. The students are able to choose a certain optical sensor for a specified optical problem. The students will learn to differentiate between the different optical metrology tasks. Students are capable to solve complex problems in the field of optical metrology.

**Course objectives**

1. Optical basics and components
2. 3D shape detection
3. Temperature examination techniques
4. Measurements of fluid flows
5. Optical detection of mechanical vibrations and motion studies
6. Surface analysis
7. Optical determination of mechanical strain
8. Distance and velocity detection
9. Deformation measurement

**Course contents**
<table>
<thead>
<tr>
<th>Course Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Damage detection</td>
</tr>
<tr>
<td>11. Special applications of optical metrology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Donati: Electro-Optical Instrumentation: Sensing and Measuring with Lasers; Prentice Hall</td>
</tr>
<tr>
<td>K. J. Gåsvik: Optical Metrology; Wiley</td>
</tr>
<tr>
<td>M. Schuth + W. Buerakov: Handbuch Optische Messtechnik; Hanser Verlag</td>
</tr>
<tr>
<td>G. Booker: Sensors for Ranging and Imaging; Scitech Publishing</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Teaching methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture, seminar-like instructions, exercises</td>
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<table>
<thead>
<tr>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination, 90 min.</td>
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<table>
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</tr>
</thead>
<tbody>
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<td>English</td>
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</table>

<table>
<thead>
<tr>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
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Introduction to the Finite Element Method

<table>
<thead>
<tr>
<th>Course title</th>
<th>Introduction to the Finite Element Method with NASTRAN &amp; PATRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECTS</td>
<td>4</td>
</tr>
<tr>
<td>Course type</td>
<td>Lectures with workshops</td>
</tr>
<tr>
<td>SWS</td>
<td>4</td>
</tr>
<tr>
<td>Semester</td>
<td>Winter and summer</td>
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<tr>
<td>Workload in hours</td>
<td>Total: 120 / in-class: 40 / Self-study: 80</td>
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<tr>
<td>Lecturer</td>
<td>Prof. Dr. Christian Bongmba</td>
</tr>
<tr>
<td>Course objectives</td>
<td>The main aim is to introduce students to the direct stiffness method. They learn how to derive the stiffness matrices for springs, bars, beams, two- and three-dimensional finite elements. The workshops introduce students to MSC NASTRAN and PATRAN. Students learn how to use PATRAN for pre- and post-processing and NASTRAN as a solver. They learn how to import geometry into PATRAN, carry out the discretization, define material and section properties and boundary conditions and set up a finite element analysis.</td>
</tr>
</tbody>
</table>
| Course contents | 1. Introduction – What is the Finite Element Method?  
2. Discretization examples  
3. Development of truss element  
4. Development of beam element  
5. Two-dimensional elements  
6. Three-dimensional elements  
7. Workshops with MSC NASTRAN und PATRAN linear static, normal modes and buckling |
<p>| Recommended literature | Logan, Daryl L.: A First Course in the finite Element Method, CENGAGE Learning 2012. |</p>
<table>
<thead>
<tr>
<th><strong>Teaching methods</strong></th>
<th>Lectures, workshops and videos</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment method</strong></td>
<td>Workshops and term paper</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Statics, Strength of Materials</td>
</tr>
</tbody>
</table>
# Introduction to Solidworks (CAD)

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Introduction to Solidworks (CAD)</th>
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<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Lecture with CAD exercises</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 90 / In-class: 30 / Self-study: 60</td>
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<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr.-Ing. Karl Hain</td>
</tr>
<tr>
<td><strong>Course Objectives</strong></td>
<td>Students are able to apply Solidworks CAD system for product development</td>
</tr>
<tr>
<td><strong>Course Contents</strong></td>
<td>• Overview and menus</td>
</tr>
<tr>
<td></td>
<td>• Sketch elements, tolerance, dimensioning</td>
</tr>
<tr>
<td></td>
<td>• Modeling single parts</td>
</tr>
<tr>
<td></td>
<td>• Modeling assemblies</td>
</tr>
<tr>
<td></td>
<td>• Modeling welded parts</td>
</tr>
<tr>
<td></td>
<td>• Simulations</td>
</tr>
<tr>
<td><strong>Teaching Methods</strong></td>
<td>Supervised CAD exercises at PCs</td>
</tr>
<tr>
<td><strong>Assessment Method</strong></td>
<td>Written examination, 90 min.</td>
</tr>
<tr>
<td><strong>Language of Instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Basics of design and product development</td>
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</table>
### Advanced Solidworks (CAD)

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Advanced Solidworks (CAD)</th>
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</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Practical exercises with CAD system Solidworks</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 90 / In-class: 30 / Self-study: 60</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr.-Ing. Karl Hain</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>Students are able to apply Solidworks CAD system for more complex product development</td>
</tr>
<tr>
<td><strong>Course contents</strong></td>
<td>• Loft boss/base techniques</td>
</tr>
<tr>
<td></td>
<td>• Spline functions</td>
</tr>
<tr>
<td></td>
<td>• Surface modelling tools and techniques</td>
</tr>
<tr>
<td></td>
<td>• Sheet metal parts</td>
</tr>
<tr>
<td></td>
<td>• Advanced mechanical mates for assemblies</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>Solidworks online help</td>
</tr>
<tr>
<td><strong>Teaching methods</strong></td>
<td>CAD exercises / practical work</td>
</tr>
<tr>
<td><strong>Assessment method</strong></td>
<td>Written examination, 90 min.</td>
</tr>
<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Basic knowledge of design and product development</td>
</tr>
</tbody>
</table>
# MATLAB in Engineering Applications

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>MATLAB in Engineering Applications</th>
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</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Lecture with computer exercises (computer lab)</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 60 / In-class: 24 / Self-study: 36</td>
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<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr. Mathias Hartmann</td>
</tr>
</tbody>
</table>

**Course objectives**
Students are able to handle the MATLAB Desktop and are aware what MATLAB can do or can’t do. They are prepared to solve simple and advanced numerical problems in MATLAB and can transfer these capabilities to basic engineering applications. To solve more sophisticated problems, participants of the course are up to formulate programs in the MATLAB m-file language.

**Course contents**

1. An Overview of MATLAB ®
2. Numeric, Cell, and Structure Arrays
3. Functions and Files
4. Programming with MATLAB
5. Advanced Plotting
6. Model Building and Regression
7. Statistics, Probability, and Interpolation
8. Linear Algebraic Equations
10. Simulink
11. Symbolic Math: MuPAD

**Recommended literature**
Palm, W. J.: Introduction to MATLAB for Engineers

**Teaching methods**
Lecture with integrated MATLAB exercises
<table>
<thead>
<tr>
<th><strong>Assessment method</strong></th>
<th>Written examination, 60 min.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>Calculus, basic computer knowledge</td>
</tr>
</tbody>
</table>
# Introduction to Quality Management

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Introduction to Quality Management</th>
</tr>
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<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Lecture</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 60 / In-class: 30 / Self-study: 30</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr. Christian Wilisch</td>
</tr>
</tbody>
</table>

**Course objectives**

Quality management (QM) is an indispensable tool not only in production environments but in all aspects of commerce. This course aims to provide students with basic knowledge about QM techniques and their applications.

**Course contents**

- What is 'quality'?
- Historical context of quality management
- Financial aspects of quality management
- Quality techniques and their applications
- Process control techniques

**Recommended literature**

- Chalkiadakis, Ioannis: New Product Development with the Use of Quality Function Deployment, Lambert, Mauritius, 2019

**Teaching methods**

Lectures with discussions and presentations

**Assessment method**

Written paper to be presented in class
<table>
<thead>
<tr>
<th><strong>Language of instruction</strong></th>
<th>English</th>
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</thead>
<tbody>
<tr>
<td><strong>Prerequisites</strong></td>
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</tr>
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# Projects in Science and Engineering

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Projects in Science and Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECTS</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Course type</strong></td>
<td>Project</td>
</tr>
<tr>
<td><strong>SWS</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
</tr>
<tr>
<td><strong>Workload in hours</strong></td>
<td>180</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr. Thomas Stirner</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>Knowledge of project management; analysis, distribution and solution of the tasks in a small team; obtaining and presenting results; practical application of the theoretical knowledge base; communication and team skills; strategic planning; time-management skills; problem-solving skills</td>
</tr>
<tr>
<td><strong>Course content</strong></td>
<td>Projects or part of a project may be of a theoretical nature (e.g. literature review, software development, data mining, etc.) or of an experimental nature (e.g. design of experiment, measurements, etc); project descriptions will be made available at the beginning of the semester; teams will be built to solve the tasks; each team will work on project results, which will be presented in written form and orally</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>Specific to the project</td>
</tr>
<tr>
<td><strong>Teaching methods</strong></td>
<td>Supervision</td>
</tr>
<tr>
<td><strong>Assessment method</strong></td>
<td>Written report and oral presentation</td>
</tr>
<tr>
<td><strong>Language of Instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td>-----------------------------</td>
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</tr>
<tr>
<td><strong>Prerequisites</strong></td>
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# Advanced Projects in Science and Engineering

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ECTS</td>
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<td>Course type</td>
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<td>SWS</td>
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<tr>
<td>Semester</td>
<td>Winter and summer</td>
</tr>
<tr>
<td>Workload in hours</td>
<td>180</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Prof. Dr. Thomas Stirner</td>
</tr>
</tbody>
</table>

### Course objectives
- Deeper knowledge of project management; further analysis, distribution and solution of advanced tasks in a small team; obtaining and presenting results; extensive practical application of the theoretical knowledge base; enhanced communication and team skills; strategic planning; time-management skills; problem-solving skills

### Course content
- Advanced projects or part of an advanced project may be of a theoretical nature (e.g. literature review, software development, data mining, etc.) or of an experimental nature (e.g. design of experiment, measurements, etc.); project descriptions will be made available at the beginning of the semester; teams will be built to solve the advanced tasks; each team will work on project results, which will be presented in written form and orally

### Recommended literature
- Specific to the project

### Teaching methods
- Supervision
<table>
<thead>
<tr>
<th><strong>Assessment method</strong></th>
<th>Written report and oral presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language of Instruction</strong></td>
<td>English</td>
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<tr>
<td><strong>Prerequisites</strong></td>
<td>Projects in Science and Engineering</td>
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## Projects in Industrial Engineering

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>Projects in Industrial Engineering</th>
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<tbody>
<tr>
<td><strong>ECTS</strong></td>
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<td><strong>Course type</strong></td>
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<td><strong>SWS</strong></td>
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<tr>
<td><strong>Semester</strong></td>
<td>Winter and summer</td>
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<td><strong>Workload in hours</strong></td>
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<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr. Jutta Stirner</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>Knowledge of project management; analysis, distribution and solution of the tasks in a small team; obtaining and presenting results; practical application of the theoretical knowledge base; communication and team skills; strategic planning; time-management skills; problem-solving skills.</td>
</tr>
<tr>
<td><strong>Course content</strong></td>
<td>Projects or part of a project may be of a theoretical nature (e.g. literature review, data mining, etc.) or of analytical nature (e.g. business plan, etc.); project descriptions will be made available at the beginning of the semester; teams will be built to solve the tasks; each team will work on project results, which will be presented in written form.</td>
</tr>
<tr>
<td><strong>Recommended literature</strong></td>
<td>Specific to the project</td>
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<tr>
<td><strong>Teaching methods</strong></td>
<td>Supervision</td>
</tr>
<tr>
<td><strong>Assessment method</strong></td>
<td>Written report</td>
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<td><strong>Language of instruction</strong></td>
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<td>----------------------------</td>
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<td><strong>Prerequisites</strong></td>
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<tr>
<td><strong>Miscellaneous</strong></td>
<td>Max. 10 participants</td>
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### Advanced Projects in Industrial Engineering

<table>
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<th><strong>Course title</strong></th>
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<td>Winter and summer</td>
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<td><strong>Workload in hours</strong></td>
<td>180</td>
</tr>
<tr>
<td><strong>Name of lecturer</strong></td>
<td>Prof. Dr. Jutta Stirner</td>
</tr>
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</table>

**Course objectives**: Deeper knowledge of project management; further analysis, distribution and solution of advanced tasks in a small team; obtaining and presenting results; extensive practical application of the theoretical knowledge base; enhanced communication and team skills; strategic planning; time-management skills; problem-solving skills

**Course content**: Advanced projects or part of an advanced project may be of a theoretical nature (e.g. literature review, data mining, etc.) or of a statistical nature (e.g. data analysis etc.); project descriptions will be made available at the beginning of the semester; teams will be built to solve the advanced tasks; each team will work on project results, which will be presented in written form.

**Recommended literature**: Specific to the project: Google Scholar, Science Direct via THD library

**Teaching methods**: Supervision

**Assessment method**: Written report
<table>
<thead>
<tr>
<th><strong>Language of Instruction</strong></th>
<th>English</th>
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<tr>
<td><strong>Prerequisites</strong></td>
<td>Projects in Industrial Engineering</td>
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# International Business Development

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<tr>
<td>Course ID</td>
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<tr>
<td>ECTS</td>
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<tr>
<td>Semester</td>
<td>Winter</td>
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<tr>
<td>Workload in hours</td>
<td>Total: 150 / In-class: 60 hrs / Self-study: 90 hrs</td>
</tr>
<tr>
<td>Lecturer</td>
<td>Mr. Jack Romero</td>
</tr>
</tbody>
</table>

## Course objectives

The course is for students interested in starting their own businesses or focusing on international business development. The aim is to prepare students with skills involved in launching and leading businesses but also to use those skills to develop and run businesses or business units with a direction toward innovation, international expansion and growth. Students gain theoretical insights with practical applications in a learning environment characterized by active participation, both individually and in groups.

## Course contents

**Perspectives on Strategy:**
- Strategic thinking from both an internal and external perspective.
- Foundations of strategy and strategic perspectives
- Strategies for innovation, product, process, organization, marketing

**Entrepreneurship and Business Growth**
- Maintaining entrepreneurial drive
- Government partnering
- Turnaround strategies

**Managing Networks and Internationalisation**
- How to develop business capabilities through internationalization and networking
- Building, maintaining and supporting businesses with various modes of foreign operations
### Meeting competition from existing incumbents as well as new entrants
### Balancing cooperation and competition

#### Strategizing in Business Development
- Participation in a real-life strategic process
- Acting based on assembled knowledge
- Developing a business idea

#### Teaching methods
- Lectures
- Group work
- Case studies
- Learning based on experiences
- Exercises

#### Recommended literature
- **Exploring strategy**
  Angwin Duncan, Johnson Gerry, Regner Patrick, Scholes Kevan, Whittington Richard
  ISBN: 9781292002552 (pbk.)

- **International Business Expansion**
  Anthony Gioli
  Over And Above Press: 2014
  ISBN: 978-0989091749

#### Assessment method
written paper

#### Language of instruction
English
# IT Skills for Project Managers

<table>
<thead>
<tr>
<th><strong>Course title</strong></th>
<th>IT Skills for Project Managers</th>
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<tbody>
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<td><strong>ECTS</strong></td>
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<td>Lecture</td>
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<td><strong>Semester</strong></td>
<td>Winter</td>
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<tr>
<td><strong>Workload in hours</strong></td>
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</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Reijo Koivula</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>This course is suitable not only for students who are planning to specialize in project management, but also for students who plan to become operating, product, marketing and general managers.</td>
</tr>
<tr>
<td><strong>Course contents</strong></td>
<td>The emphasis is not on becoming an IT specialist but rather on how to use information systems and software applications in the context of efficiently managing projects.</td>
</tr>
<tr>
<td><strong>Teaching methods</strong></td>
<td>In-class lectures and virtual sessions</td>
</tr>
<tr>
<td><strong>Assessment method</strong></td>
<td>Written paper</td>
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<td><strong>Language of instruction</strong></td>
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<td><strong>Prerequisites</strong></td>
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# Principles of Management and Scientific Writing

<table>
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<tr>
<th><strong>Course title</strong></th>
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<tbody>
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<td><strong>Course type</strong></td>
<td>Lecture</td>
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<td><strong>SWS</strong></td>
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<tr>
<td><strong>Semester</strong></td>
<td>Winter</td>
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<tr>
<td><strong>Workload in hours</strong></td>
<td>Total: 150 / In-class: 60 / Self-study: 90</td>
</tr>
<tr>
<td><strong>Lecturer</strong></td>
<td>Prof. Dr. Adrian Hubel / Susanne Reimann</td>
</tr>
</tbody>
</table>

**Course objectives**

Students should become aware of the various aspects, components, and functions of management and discover why the subject of international management is both attractive and demanding. A variety of aspects relevant in regard to management is broadly to make students aware of the breadth of possible career choices available to them before they choose to specialize. Students learn to analyze and understand current issues and developments in international business contexts and develop an understanding for business ethics.

The purpose of the part “Scientific Writing” is to teach and model how to write scientific papers and bachelor thesis. Students should learn how getting started with the research topic, the necessary components (introduction, results, discussion) of a scientific paper. The course deals with the question what is plagiarism, how to avoid it and how does correct paraphrasing and citing work. Furthermore, students will get an introduction in literature research.

**Course contents**

**Principles of Management**

The course shows students how and why businesses operate the way they do by covering essential introductory business topics. Students are presented with a broad picture of the various aspects and functions of business that together make for a successful enterprise and are
introduced to the concept of strategic planning as it relates to business organisations. Topics introduced include business planning, organisation, the business environment, management, marketing, finance, production, human resource management, and business ethics. Outline:
1. The Concept of Management
2. The Evolution of Management
3. Management in a Changing Environment
4. Business Ethics and Corporate Social Responsibility
5. Management Practice
6. Case Studies

**Scientific Writing**
The course covers mainly the following items:
1. Selecting a Research Topic
2. Using the Literature to Research the Problem
3. Conducting Ethical Research
4. Structure and Style of the Paper: Introduction, Methods, Results, Discussion
5. Formatting, Reference List, Tables, Figures, Appendixes

*Recommended literature*


*Teaching methods*
The course makes extensive use of short international oriented case studies to illustrate the practical problems facing businesses. The students are asked to assume the role of entrepreneur for evaluating how various principles of management should be applied. Students are placed in small teams to analyse and prepare particular cases for presentation. Their overriding task is determining how certain basic management principles can be applied to practice. Team presentations are followed up with instructor feedback and a lively discussion revolving around a list of written analytical questions prepared by students not making the presentations. The instructor’s
role is to assure that key concepts are correctly interpreted, summarised and stressed.

<table>
<thead>
<tr>
<th><strong>Assessment method</strong></th>
<th>oral examination, assignment (written paper)</th>
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</thead>
<tbody>
<tr>
<td><strong>Language of instruction</strong></td>
<td>English</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
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