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German A1/ Parts 3 and 4

Course title	German A1/ Parts 3 and 4
ECTS	4
Course type	Course with exercises
SWS	4
Semester	Winter and Summer
Workload in hours	60 hrs
Lecturer	Dr. Virginia Wallner
Course objectives	<ul style="list-style-type: none"> • 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 <p>http://www.europaeischer-referenzrahmen.de</p>
Course contents	<ul style="list-style-type: none"> • Grammar <ul style="list-style-type: none"> – Prepositions – Possessives – Dative verbs – The imperative-Simple past 'war/ hatte' – The perfect form – Word formation – Subjunctive II • Topics <ul style="list-style-type: none"> – Apartments and houses – Parts of the body – Describing people and their character – Household activities – Weather – Holidays and celebrations

Recommended literature	<p>Menschen. Deutsch als Fremdsprache. Kursbuch A1.2 Hueber. Kapitel 13-24 ISBN 978-3-19-561901-1</p> <p>Menschen. Deutsch als Fremdsprache. Arbeitsbuch A1.2 mit Audio-CD. Hueber. Kapitel 13-24 ISBN 978-3-19-511901-6</p>
Teaching methods	<ul style="list-style-type: none"> • 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>

English in Technical Contexts B2

Course title	English in Technical Contexts B2
ECTS	2
Course type	Language training course
SWS	2
Semester	Winter and summer
Course level	<p>B2</p> <ul style="list-style-type: none"> • 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 <p>http://www.europaeischer-referenzrahmen.de/</p>
Lecturer	Neal O'Donoghue, MA
Course objectives	<p>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.</p> <p>The course is designed to be relevant and interesting for engineering students and will be adapted to their learning needs and study areas.</p> <p>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.</p>

Course contents	<p><i>Obligatory topics (60 %):</i></p> <ul style="list-style-type: none"> • 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 <p><i>Variable content (40 %):</i> 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.</p>
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Teaching methods	<p>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.</p> <p>Work not completed in class should be done at home. Self-study assignments will be set on a weekly basis.</p>
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Assessment method	<p>Written exam (60 min)</p> <p>No dictionaries are allowed.</p> <p>Exam structure:</p> <ul style="list-style-type: none"> • 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) <p>The exam will be based on topics covered during the semester.</p>
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Recommended Literature	<p>Astley, Peter, and Lewis Lansford. <i>Engineering 1: Student's Book</i>. Oxford: Oxford UP, 2013. Print.</p> <p>Bauer, Hans-Jürgen. <i>English for Technical Purposes</i>. Berlin: Cornelsen, 2000. Print.</p>
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Bonamy, David. Technical English 4. Harlow, England: Pearson Education, 2011. Print.

Bonamy, David, and Christopher Jacques. Technical English 3. Harlow: Pearson Longman, 2011. Print.

Brieger, Nick, and Alison Pohl. Technical English: Vocabulary and Grammar. Oxford: Summertown, 2002. Print.

Dummett, Paul. Energy English: For the Gas and Electricity Industries. Hampshire: Heinle, Cengage Learning, 2010. Print.

Dunn, Marian, David Howey, and Amanda Ilic. English for Mechanical Engineering in Higher Education Studies Coursebook. Reading: Garnet Education, 2010. Print.

engine: Englisch für Ingenieure. <www.engine-magazin.de> (Darmstadt). Various issues. Print.

Foley, Mark, and Diane Hall. MyGrammarLab. Harlow: Pearson, 2012. Print.

Glendinning, Eric H., and Norman Glendinning. Oxford English for Electrical and Mechanical Engineering. Oxford: Oxford UP, 1995. Print.

Glendinning, Eric H., and Alison Pohl. Technology 2. Oxford: Oxford UP, 2008. Print.

Heidenreich, Sharon. English for Architects and Civil Engineers. Wiesbaden: Vieweg + Teubner Verlag, 2008. Print.

Ibbotson, Mark. Cambridge English for Engineering. Cambridge: Cambridge UP, 2008. Print.

Ibbotson, Mark. Professional English in Use. Engineering: Technical English for Professionals. Cambridge: Cambridge UP, 2009. Print.

Markner-Jäger, Brigitte. Technical English: Civil Engineering and Construction. Haan-Gruiten: Verl. Europa-Lehrmittel, 2013. Print.

Murphy, Raymond. English Grammar in Use. Cambridge: Cambridge UP, 2004. Print.

	Schäfer, Wolfgang. Construction Milestones: Englisch Für Bau-, Holz- Und Anlagenberufe. Stuttgart: Klett, 2013. Print.
	Wagner, Georg, and Maureen Lloyd. Zörner. Technical Grammar and Vocabulary: A Practice Book for Foreign Students. Berlin: Cornelsen, 1998. Print.
Language of instruction	English
Prerequisites	B1 / Abitur (A-levels/ school leaving certificate giving right of entry to higher education) / 7-9 years of English

Intercultural Training for Germany and Bavaria

Course title	Intercultural Training for Germany and Bavaria
ECTS	1
Course type	Elective
SWS	1
Semester	Winter and summer
Workload in hours	30 hours
Name of Instructor	Lisa Werner
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	<ul style="list-style-type: none"> I. Culture (theroies) 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	<p>Bolten J. und Ehrhardt C., Interkulturelle Kommunikation, Verlag Wissenschaft & Praxis 2003; Bolten J, Einführung in die interkulturelle Wirtschaftskommunikation, Vandenhoeck & Ruprecht 2007</p>
Teaching methods	<p>The course is organized according to four pillars:</p> <ul style="list-style-type: none"> 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.

Assessment method Paper

Language of instruction English/German

Prerequisites None

Basics of International Sales and Business Development

Course title	Basics of International Sales and Business Development
Course ID	268
ECTS	2
Course type	Lecture with group work and presentations
SWS	2
Semester	Winter and summer
Lecturer	Ibrahim Waked
Course objectives	General knowledge of international sales and strategic business development mechanisms. As well as profound analysis of practical case studies.
Course contents	<ul style="list-style-type: none"> • 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	<p>Strategic Management by Richard Lynch von Pearson Longman</p> <p>Business Development Management By Lutz Becker, Walter Gora, Tino Michalski</p>
Teaching methods	Lecture with integrated project development examples
Assessment method	Presentation and seminar paper
Language of instruction	English

Bavarian Culture

Course title	Bavarian Culture
Course ID	229
SWS	2
Semester	Winter and summer
ECTS	2
Course type	Elective
Language of instruction	English
Name of lecturer	Jennifer Hauer
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	<ol style="list-style-type: none"> 1. Hard facts <ol style="list-style-type: none"> 1.1. History 1.2. Demographics 1.3. Geography 2. Customs and rituals <ol style="list-style-type: none"> 2.1. Traditional 2.2. Contemporary 3. Language 4. Events
Teaching methods	<p>The course is organized according to four pillars:</p> <ol style="list-style-type: none"> 1. Hard Facts 2. Customs and Rituals 3. Language 4. Events <p>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</p>

origin, as well as learning and engaging in cultural rituals themselves. The aim is to deepen and complement the contents taught in the Orientation Week.

Recommended literature

Jonas, B., Gebrauchsanweisung für Bayern, Piper Verlag, 2007

Assessment methods

Seminar paper

Prerequisites

Participants should have attended the introductory Intercultural Training during the Orientation Week.

Business Storytelling

Course title	Business Storytelling
Course ID	296
ECTS	2
Course type	Elective
SWS	2
Semester	Winter and summer
Workload in hours	Total: 60 / In-class: 30 / Self-study: 30
Lecturers	Diego and Raphael Fiche
Course objectives	<p>At the end of this course, students will be able to:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<p>Janis Forman (2013), <i>Storytelling in Business: The Authentic and Fluent Organization</i></p> <p>Seth Godin(2005), <i>All Marketers Are Liars</i></p>

Teaching methods	<ul style="list-style-type: none">• Lectures• Group work• Case studies• Presentation• Exercises
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Assessment method	Class workshops / presentation / case studies / seminar paper
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Language of instruction	English
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Prerequisites	None
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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 rolls 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.

Suggested Literature

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

Buchanan, D., Huczynski, A.: Organizational Behavior, 5th Ed., Harlow, 2004;

Wagner, M., Waldmann, R.: Vom Outdoor-Training zur Teamentwicklung, Welchen Beitrag leisten Hochseilgärten? in: Jagenlauf, M./Michl, W. (Hrsg.) Erleben und Lernen – Internationale Zeitschrift für handlungsorientiertes Lernen, 1/2004

Notes

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.

EcoLab-News – News from Ecology and Economy

Course title	EcoLab-News – News from Ecology and Economy
ECTS	2
Course type	Elective
SWS	2
Semester	Summer
Workload in hours	Total: 60 / In-class: 30 / Self-study: 30
Lecturer	Prof. Dr. Robert Feicht
Course objectives	<p>Do you want to understand current climate policy issues and participate in sustainable development? The Fridays for Future movement has proven that properly set information will be heard. Together we will develop a kind of "information service" for the European Campus, which informs about the latest news, trends and movements in the field of sustainability and international politics. Methods expertise: In group work, various topics should be developed in a way that makes them easily understandable and communicable. Professional skills: Current knowledge in the field of sustainability and/or international politics. Social competence: Students work in groups. They learn the dynamics of team work and competences like systemic thinking, forward-thinking and acting, critical thinking, competence for fair and environmentally friendly action as well as competence in planning and implementing innovative projects.</p>
Course contents	<p>Development and implementation of an "information service" (newsletter, posts) in the field of sustainability and/or international politics. Preparation of current political topics, but also trends and developments in the field of sustainability for different target groups and different media.</p>

Teaching methods	Group discussion and group work. Summary and presentation of the results.
Assessment method	seminar paper and presentation
Language of instruction	English
Prerequisites	None. Good writing skills and interest in current sustainable and/or political topics would be beneficial.

Innovation Management for Artificial Intelligence

Course title	Innovation Management for Artificial Intelligence
ECTS	3
Course type	Lecture and seminar
SWS	2
Semester	Winter semester
Workload in hours	90 hours
Lecturer	Prof. Dr. Patrick Glauner
Course objectives	<p>In recent years, plenty of companies have started to invest in AI in order to remain competitive. However, some 80% of AI project fail in reality. There is clearly an acute need in industry for experts that get the big picture of what needs to be done so that AI adds value to companies. This novel course addresses that need. Students will learn a number of challenges, both technical and managerial, that companies typically face when becoming AI-driven companies. They will also learn respective best practices along the entire data journey and how these lead to deployed applications that create real business value.</p>
Course contents	<ul style="list-style-type: none"> • Introduction: how AI is changing our society, selected examples of successful and unsuccessful AI projects and transformations • History and promises of AI: Dartmouth conference, AI from 1955 to 2011, AI winters • Deep learning era: breakthroughs, DeepMind, promises and hypes, no free lunch theorem, AI innovation in China, technological singularity • Contemporary problems: regulation, explainable AI, ethics • AI transformation of companies: opportunities, challenges, best practices • Case studies on how to turn companies into AI-driven companies

Recommended literature	<ol style="list-style-type: none">1. P. Glauner and P. Plugmann (Eds.), "Innovative Technologies for Market Leadership: Investing in the Future", ISBN 978-3-030-41308-8, Springer, 2020.2. M. Iansiti and K. Lakhani, "Competing in the Age of AI: Strategy and Leadership When Algorithms and Networks Run the World", ISBN 978-1633697621, Ingram Publisher Services, 2020.3. K.-F. Lee, "AI Superpowers: China, Silicon Valley, and the New World Order", ISBN 9781328606099, Mariner Books, 2018.
Teaching methods	Lecture and seminar
Assessment method	Seminar presentation
Language of instruction	English
Prerequisite	None

Quantum Computing

Course title	Quantum Computing
ECTS	5
Course type	Lecture and seminar
SWS	4
Semester	Winter semester
Workload in hours	150 hours
Lecturer	Prof. Dr. Patrick Glauner, Prof. Dr. Horst Kunhardt
Course objectives	<p>This class provides students with an introduction to Quantum Computing (QC), which looks promising to solve certain computational problems substantially faster than classical computers. QC began in the early 1980s and in recent years, investment into QC research has increased in both the public and private sectors. Students will acquire knowledge in QC and its applications in various domains such as machine learning and cryptography. They will also be able to elaborate it further in the future, for example in projects or further studies. Overall, QC is a cutting-edge field, with many high-pay opportunities for graduates.</p>
Course contents	<ul style="list-style-type: none"> • Introduction: history, comparison to traditional computing, applications, business potentials • Foundations: complex numbers, complex vector spaces • Systems: deterministic systems, probabilistic systems, quantum systems, assembling systems • Quantum theory: states, superposition, observables, measuring, dynamics, assembling quantum systems, entanglement • Architecture: bits and qubits, classical gates, reversible gates, quantum gates, no-cloning theorem • Selected algorithms: Deutsch's, Deutsch-Jozsa, Simon's, Grover's, Shor's • Theoretical computer science: limits of quantum computing, complexity classes

	<ul style="list-style-type: none"> • Quantum computers and programming: goals and challenges, decoherence, physical realizations, quantum annealing, adiabatic quantum computing • Applications: quantum machine learning, quantum cryptography, quantum information theory
Recommended literature	<ol style="list-style-type: none"> 1. P. Glauner and P. Plugmann (Eds.), "Innovative Technologies for Market Leadership: Investing in the Future", Springer, 2020. 2. N. S. Yanofsky and M. A. Manucci, "Quantum Computing for Computer Scientists", Cambridge University Press, 2008.
Teaching methods	Lecture and seminar
Assessment method	Seminar presentation
Language of instruction	English
Prerequisite	None

Big Data

Course title	Big Data
ECTS	4
Course type	Lecture and seminar
SWS	4
Semester	Winter semester
Workload in hours	120 hours
Lecturer	Prof. Dr. Patrick Glauner
Course objectives	<p>This class provides students with an introduction to the field of big data. Students will acquire a solid foundation in how to design and implement big data systems. They will also learn hands-on how to use industrial big data tools. Furthermore, they will understand the limitations of big data-driven approaches and how they can recognize and solve typical issues in big data, such as data quality and biases. As an outcome, they will be able to work on real-world problems that not only require knowledge in AI, but also an expertise in how to use big data infrastructures, frameworks, libraries and tools.</p>
Course contents	<ul style="list-style-type: none"> • Introduction: 3 Vs, history of big data, selected big data use cases • Complexity analysis: time complexity, O, Ω, Θ, o and \tilde{O} notations, space complexity, recurrence relations, master theorem, dynamic programming • Multithreading: parallelism and concurrency, creating threads, global interpreter lock (GIL) • Databases: ER diagrams, relational databases, database management systems, queries, indexes, normalization, transactions • Big data architectures: distributed systems, MapReduce, CAP theorem, speedup through GPUs and FPGAs • Big data, small data, all data: data quality, biases in data sets, small sample size problems

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- MLOps: project lifecycle, challenges, operations, principal components, pipelines, best practices
 - Quantum computing: qubits, quantum logic gates, quantum computers, quantum algorithms
 - Selected big data infrastructures, frameworks, libraries and tools
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Recommended literature

1. A. Petrov, "**Database Internals: A Deep Dive into How Distributed Data Systems Work**", O'Reilly Media, 2019.
 2. M. Goodrich, et al., "**Data Structures and Algorithms in Python**", John Wiley & Sons, 2013.
 3. E. Raj, "**Engineering MLOps: Rapidly build, test, and manage production-ready machine learning life cycles at scale**", Packt, 2021.
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Teaching methods

Lecture and seminar

Assessment method

Written examination 80 min.

Language of instruction

English

Prerequisite

None

Database Engineering

Course title	Database Engineering
ECTS	5
SWS	4
Semester	Winter and summer
Workload in hours	In-class: 60 hrs. / Self-study: 90 hrs / Total: 150 hrs
Lecturer	Prof. Dr. Udo Garmann
Course objectives	<p>After this module students should</p> <ul style="list-style-type: none"> • be able to describe the database design process, • know the elements of the Entity-Relationship-Model, • can build an Entity Relationship Model for a specific case, • can normalize a database design, • be able to manage a database through a database management system, • be able to query a database using SQL, • know the core components and functionalities of a database management system.
Recommended literature	<p>Conolly, Thomas M.; Begg, Carolyn E.: Database Solutions - A step-by-step guide to building databases. 2nd Edition. Harlow, Essex: Pearson Education Limited, 2004</p> <p>Conolly, Thomas M.; Begg, Carolyn E.: Database systems - A practical approach to design, implementation, and management. 4th edition. Addison-Wesley, an imprint of Pearson Education, 2005</p>
Teaching methods	Classes with exercises and practical training Course and document management through E-Learning System iLearn
Assessment	

method	Written examination, 90 min.
Language of Instruction	English
Prerequisites	Basics in Computer Science

Application Design

Course title	Application Design
ECTS	5
Course type	Lecture
SWS	4
Semester	Winter
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr. Marcus Barkowsky
	<p>The module deepens knowledge in the field of architecture for media systems. It is based on the lectures basics of programming and design techniques into the media applications. Students should be able to know and apply the typical pattern for media applications.</p> <p>After completion of the module the students have achieved the following learning objectives:</p>
Course objectives	<ul style="list-style-type: none"> • The students know typical issues in the design of media applications • They have designed and implemented applications that used this pattern and they know basic tools that help to minimize the amount of work • They know language-specific problem areas and know how to tackle them in the language.
Course contents	<ul style="list-style-type: none"> • Architectures • Streaming <ul style="list-style-type: none"> ○ Problem ○ Pattern ○ Buffers and their realization • Display Trees <ul style="list-style-type: none"> ○ Problem ○ Pattern ○ Render trees and their realization

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- Parallelizing processes
 - Problem
 - Pattern
 - Event trigger processes
 - Application architecture
 - Problem
 - Model, View, Controller
 - Representation of sound
 - Platform independent programming
 - Problem
 - Adapter Pattern
 - Porting 3D graphics
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Recommended literature

Bjarne Stroustrup, "The C++ Programming language", ISBN-0-201-51459-1, 199

Teaching methods

Lecture and internship

Assessment method

Written examination, 90 min.

Language of instruction

English

Prerequisites

None

Mobile and Adaptive Human Machine Interfaces

Course title	Mobile and Adaptive Human Machine Interfaces
ECTS	2.5
Course type	Lecture
SWS	2 SWS
Semester	Winter and summer
Workload in hours	Total: 150 / In-class: 75 / Self-study: 75
Lecturer	Prof. Dr.-Ing. Marcus Barkowsky
Course objectives	<ul style="list-style-type: none"> - Students can design, criticize, and implement mobile human-machine interfaces that meet the guidelines for usability, user experience, and experience quality. - Students understand the visual perception of people with regard to the development of efficient graphical user interfaces. - Students are able to follow the four phases of iterative UX design process including personas, scribbles, wireframes, and usability testing. - Students know how to implement their design with web technology, progressive web applications and native Android programming.
Course contents	<p>Perception:</p> <ul style="list-style-type: none"> - The human eye - Human visual perception - Higher cognitive processes - Gestalt Theory <p>Human-Machine interaction concepts:</p> <ul style="list-style-type: none"> - Cognitive background - Utility, Usability, User Experience - Quality of Experience <p>Designing for User Experience:</p> <ul style="list-style-type: none"> - 4 Steps of the design process - Specific considerations for design on mobile devices - Design principles for interactive Web applications using HTML, CSS, Javascript <p>Exercise on User Experience Design:</p>

	<ul style="list-style-type: none"> - Designing a sample application - Refreshing HTML, CSS, Javascript - Frameworks for Mobile Application Development - Understanding Cordova and implementing the sample application Native Application development with Android: <ul style="list-style-type: none"> - Understanding the application life cycle - Tools of Android development - Guidelines for material design usage - Implementing a sample application
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Recommended Literature	Bruce Goldstein, James Brockmole, "Sensation and Perception", 2016, 10th edition, Cengage Learning, ISBN: 978-1305580299 Pablo Perea, Pau Giner, "UX Design for Mobile", 2017, Packt Publishing, ISBN: 978-1-78728-342-8 Jens Jacobsen, Lorena Meyer, "Praxisbuch: Usability und UX", 2018, Rheinwerk Computing, ISBN: 978-3-8362-4423-7
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Teaching methods	Lecture / Exercises
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Assessment method	Written examination, 40 min. paper
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Language of Instruction	English
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Prerequisites	Basic Knowledge about Web-Technologies (HTML/CSS/JS) recommended
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Informatics I

Course title	Informatics I
ECTS	5
SWS	4
Semester	Winter
Workload in hours	Total: 150 In-class: 60 / Self-study: 45 / virtual learning: 45
Lecturer	Prof. Dr. Gökçe Aydos

After successful accomplishment the students can:

Professional competences

- summarize the challenges of biomedical text analysis
- list various scientific text resources and differentiate them
- outline the motivation behind ontologies for knowledge representation

Methodological competences

- implement shell scripts for automating information retrieval, text processing, and semantics processing
- breakdown given shell scripts into various components, tweak it for further purposes, and localize errors
- apply XPath expressions to extract data from XML files
- evaluate a shell script regarding performance considerations and suggest improvements
- apply regular expressions on text to extract relevant information
- find correlations between concepts (e.g., does caffeine lead to malignant hyperthermia?)
- implement Python programs which can solve simple text processing and automation problems

Course objectives

Social competences

- give constructive feedback to peers in context of peer-assessed exercise

Course contents	<ul style="list-style-type: none"> - data and text processing using the shell <ul style="list-style-type: none"> - biomedical text resources - semantics - data retrieval - data extraction - task repetition - XML processing - text retrieval - text processing - pattern matching - regular expressions - tokens & entities & relations - semantics processing - classes - entity linking - performance considerations - programming with Python <ul style="list-style-type: none"> - control structures - data structures - objects & algorithms
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Recommended literature	<ul style="list-style-type: none"> - Couto, Data and Text Processing for Health and Life Sciences - Joyner, Introduction to Computing, 2016, ISBN: 1-260-08227-X
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Teaching methods	Seminar-like classes, interactive exercises during lecture
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Assessment method	Written examination, 90 min.
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Language of instruction	English
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Prerequisites	Introduction to Informatics
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Advanced Automation

Course title	Advanced Automation
ECTS	5
SWS	4
Semester	Winter
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr. Terezia Toth

Course objectives

In the subject Advanced Automation, students obtain an overview on how programmable logic controllers (PLCs) work, as well as basic hardware and software requirements.

They learn the standardized (IEC61131-3) and manufacturer-specific (TIA Portal) programming options. They learn how to use visualization software for the user interface.

The students acquire the basic competence to understand automated processes in the automotive industry, power plants, chemical industry, building technology and transportation. Thus, the students are able to shape the digital transformation of the industry.

Professional Skills

The students are familiar with the concepts and components of a modern automation system including the structure and functionality of industrial communication systems, also with regard to safety and security.

They are able to analyse, classify and solve simple tasks in automation technology.

The students know the requirements of hardware and software for a Programmable Logic Controller (PLC). They know the structure and the way a PLC operates. They are

able create PLC programs. By using visualization software, they can demonstrate the processes.

Methodological Skills

The application-oriented knowledge allows the students to compare advantages and disadvantages of the individual industrial bus systems, to examine in contrast the advantages and disadvantages of the individual programming languages to find optimal solutions.

Soft Skills

The students work on problems in a focused and independent way.

They can communicate their solutions both verbally and in writing in appropriate technical language.

They learn from mistakes, can assess and improve their own abilities.

They are able to work actively as a team.

Course contents

1. Function of SPS
 - 1.1. Hardware requirements
 - 1.2. Current embodiments
 - 1.3. Environmental conditions
 - 1.4. Real-time requirements
 2. Programming languages
 3. Presentation of automation technology with regard to industrial communication
 - 3.1. ISO / OSI model in industrial communication
 - 3.2. Automation pyramid
 - 3.3. Vertical communication
 - 3.4. Structure and functionality of common communication systems
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Recommended literature	<p>-R. Laubner / P. Göhner: Prozessautomatisierung I. Springer Verlag 1999.</p> <p>-G. Wellenreuther / D. Zastrow: Steuerungstechnik mit SPS, Springer/Vieweg 2015.</p> <p>-G. Wellenreuther: Automatisieren mit SPS - Übersichten und Übungsaufgaben, Springer/Vieweg 2015.</p> <p>-K. John / M. Tiegelkamp: SPS-Programmierung mit IEC, Springer Verlag 2009.</p> <p>-G. Schnell: Bussysteme in der Automatisierungstechnik, 4. Auflage. Vieweg Verlag 2000.</p> <p>-W. Kriesel / O. Madelung: AS-Interface – Das Aktuator-Sensor-Interface für die Automation. Hanser Verlag 1999.</p> <p>-M. Popp: Profibus-DP/DPV1, 2. Auflage. Hüthig Verlag 2000.</p> <p>-M. Popp: Das PROFINET IO-Buch: Grundlagen und Tipps für Anwender, 2. Auflage. VDE Verlag 2010.</p> <p>-Ausbildungsunterlagen der Fa. Siemens: www.siemens.com/global/de/home/unternehmen/nachhaltigkeit/ausbildung/sce.html</p>
Teaching methods	Seminars with practical experience Work studies in the lab
Assessment method	Written examination, 90 min.
Language of instruction	English
Prerequisites	None

A Business process case study in SAP for Beginners

Course title	A Business process case study in SAP for Beginners
ECTS	5
Course type	Lecture
SWS	4
Semester	Summer
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr. Dieter Rummler
Course objectives	<p>It will be shown to beginners in the area of Enterprise Resource Planning Systems (ERP) the functions of ERP systems. This is done by carrying out a business process from entering a sales order to its production and delivery. At the same time the consequences in finance and accounting are shown. This makes connections in business administration visible.</p> <p>SAP R/3 is used for this. No prerequisites are required for this. The user interface, the handling of SAP R/3 and the necessary SAP transactions are explained. Essentially, in group work, an SAP case study created by myself is carried out by the students on their computers.</p>

	<ul style="list-style-type: none">• What is ERP• User interface and handling of SAP R/3 <p>Case study:</p> <ul style="list-style-type: none">• Master data• Sales forecast• Customer order• MRP run• Purchasing the components• Production of the assembly and the final product• Delivery of the sales order• Invoicing• Incoming payments• Finance• Controlling
Course contents	
Teaching methods	Lecture / case studies
Assessment method	Written examination, 90 min.
Language of instruction	English
Prerequisites	None

From Data to Big Data Analysis

Course title	From Data to Big Data Analysis and Business Intelligence
ECTS	5
Course type	Lecture
SWS	4
Semester	Summer
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr. Dieter Rummler
Course objectives	<p>This course brings you from Data to Big Data Analysis and Business Intelligence.</p> <p>You need basic knowledge in mathematics. No programming skills necessary. All used tools you can download for free.</p> <p>In EXCEL we will work with diagrams and Power Pivot tables, after an introduction to fundamentals in EXCEL. We will enter more intelligence to data with the tool POWER Business Intelligence (BI). We will add interesting insights to data to find information which are important for our business. We will also look forward to work with artificial intelligence to find relationships and correlations between data, and we will classify data.</p> <p>After this course, the student understands the way how to get from pure data from different sources important information, insights and knowledge for daily and strategic company decisions.</p>
Course contents	<p>Part 1 – Spreadsheet calculation</p> <ul style="list-style-type: none"> • Basics • Addressing • Data maintenance • Formula and functions • Reports <p>1.1. Spreadsheets 1.2. Subtotals 1.3. Diagrams 1.4. Pivot tables</p>

Part 2 – Bringing data together from different sources
Part 3 – Creating web and mobile phone dashboards
Part 4 – Looking for insights
Part 5 – Classification of data
Part 6 – Adding artificial intelligence to data

Teaching methods Lecture

Assessment method Written examination, 90 min.

Language of instruction English

Prerequisites None

Media Skills and Self-Organization

Course title	Media Skills and Self-Organization
ECTS	2
Course type	Lecture
SWS	2
Semester	Winter
Workload in hours	Total: 75 / In-class: 30 / Self-study: 40
Lecturer	Kathrin Auer, M.A.
Course objectives	<p>The digital transformation of society advances further into our work life and also private life and is hallmarked by a rapidly increasing plethora of information. In order to be able to handle this amount of information and in order to be able to communicate accordingly, students need a high level of media literacy. The contents of this course align with the media competency grid of the standing conference of the ministers of education and cultural affairs (2016) and its six pillars:</p> <ol style="list-style-type: none"> 1. Searching, processing and storing for/of information 2. Communication and cooperation 3. Production and presentation 4. Protection and safe operating 5. Problem solving and acting 6. Analyzing and reflecting <p>It is the aim of this course to broaden the competencies gained at school specifically for the challenges of studying. In this context, not searching for and presenting information are crucial in this course, but the selection, assessment and interpretation of information (analysis and synthesis). This subject is an introduction not only to digital media in the context of studying, but also to data protection, copyright and an independent organization of the own studies.</p>

Professional expertise:

- The students know various digital media for study organization and are able to apply them.
- The students are enabled to choose appropriate analogue and digital teaching- and study contents for their specific studies.
- The students are able to use digital media competently and in a targeted manner.
- Students are able to organize their studies both in matters of time and contents and to work goal oriented with a plethora of information.

Methodical expertise:

- The students are enabled to work independently.
- The students acquire competencies in the usage of digital media.
- The students acquire knowledge on strategies of knowledge acquisition with the Blended Learning approach.

Personal competencies:

The students acquire the ability to work independently and how to plan and act using a solution-based approach.

Social competencies:

- Within exercises, students train partner- and teamwork.
- The students train working independently.

Course contents**Information, data and knowledge:**

- How to organize oneself and one's studies
- Digital media in the context of studying
- Digital media in science and communication
- Data protection and Netiquette
- Copyright and right of use
- Media use and pillars of media literacy

Recommended literature

See module handbook: <https://www.thdeg.de/Studierende/Antraege-und-Organisatorisches/Modulhandbuecher/Module%20Handbooks/modulhandbuch-ain-b-en.pdf>

Teaching methods

- Seminaristic lectures with group- and teamwork.
- Project work
- Blended learning

Assessment method Written examination, 60 min

Language of instruction English

Prerequisites None

Business Administration

Course title	Business Administration
ECTS	3
Course type	Lecture
SWS	3
Semester	Winter
Workload in hours	Total: 75 / In-class: 30 / Self-study: 45
Lecturer	Kathrin Auer, M.A.
Course objectives	<p>In the course „Business Administration“, students will focus on general Business Administration, especially with cost and performance accounting and human resources. Despite the fact that the students' focus of studies lies in a technical/ IT-oriented field, students should get a broad knowledge also on business topics in order to facilitate their career start. By broadening the knowledge base with students, suboptimal decisions within companies should be avoided.</p> <p><u>Professional expertise:</u></p> <ul style="list-style-type: none"> - The students get to know the operational functions within companies and also selected concepts of business management and strategy. - The students get to know and understand the fundamentals and methods of systematic decisionmaking. - The students get to know the purpose of cost and performance accounting and the structure of such system. - They get to know important instruments of cost and performance accounting, of cost center accounting and cost unit accounting and are familiar with monthly short-term income statements. - They are qualified to perform and assess cost center related and order-based target-actual comparisons.

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- They can apply marginal costing in the form of contribution margin accounting
 - They are qualified for decision accounting on the basis of this course

Methodical expertise:

- The students are enabled to work transparency-, structurally and decision-oriented by the help of cost accounting.
- The students gain awareness that cost accounting is purposeful
- The students are enabled to work independently.
- The students gain experience in learning strategies like Blended learning methods.

Personal competencies:

Students gain knowledge of independent and problem-, solution- and acting-focused work with the help of exercises.

Social competencies:

Students train partner- and teamwork within the exercises. Students learn independent work.

Companies- an overview over the most important functions:

- Corporate governance and corporate policy
- Vision, goals, strategies
- Constructive business decisions
- Factors of production
- Business functions
- Overview over the approaches of decision theory
- Aim of cost accounting and cost allocation
- Systems of cost accounting
- Specific cost accounting contents in the field of Artificial Intelligence and Cyber Security
- Cost and performance accounting on total cost basis
- Cost-type accounting
- Cost center accounting
- Cost unit accounting
- Cost and performance accounting on a partial cost basis (contribution margin)
- Income statement
- Decision-oriented cost and performance accounting incl. the principle of relevant cost
- Basics of Marketing, Production, Procurement and Supply Chain Management

Course contents

Recommended literature	See module handbook: https://www.th-deg.de/Studierende/Antraege-und-Organisatorisches/Modulhandbuecher/Module%20Handbooks/modulhandbuch-ain-b-en.pdf
Teaching methods	Seminaristic lectures with group- and project work, Blended Learning
Assessment method	Written examination, 60 min.
Language of instruction	English
Prerequisites	None
